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A survey of technical and semiprofessional occupational needs in the Washington, D.C. area was conducted by Montgomery Junior College in an effort to devise suitable curriculums in such areas as medical auxiliary technologies, applied science technologies, and public service at the institution's proposed second campus in Rockville, Maryland. Respondents participating in the survey numbered 551 firms employing a total of 153,886 persons. Results showed that some medical auxiliary technologies, if offered as 2-year college programs, would fulfill a genuine educational need in the metropolitan area--especially the need for licensed practical nurses, associate degree nurses, medical secretaries, medical technicians, and psychiatric aides. In addition to secretarial openings, business firms indicated a need for persons trained in accounting, electronic data processing, food management, executive administration, real estate, and personnel management. In the applied science technologies it became apparent that a need existed for trained personnel in printing and graphic arts, electronic technology, engineering drafting and design, civil technology, and several other fields. Three classifications of public service needs were reported: (1) law enforcement, (2) library assisting, and (3) recreational leadership. About 257 of the firms indicated an interest in working with the college in establishing relevant educational programs. (DG)

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MONTGOMERY JUNIOR COLLEGE

1963

TECHNICAL AND SEMI-PROFESSIONAL OCCUPATIONAL SURVEY

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UNIVERSITY OF CALIF.
LOS ANGELES

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CHAPTER I

INTRODUCTION

The public junior college functions as an integral part of its service area, often in distinct contrast to neighboring educational institutions drawing students from a wide geographic area and in turn preparing graduates for positions throughout the country or world. Community college students tend to graduate from local high schools, commute from local homes, and in time seek employment in local offices and industries.

In view of this symbiotic relationship, the community college periodically needs to examine its community, to determine whether the College offerings are responsive to emerging occupational trends. Evaluation of community needs is likewise indicated when new programs are envisioned, especially when these proposed additions are of a nature to lead directly into employment at the successful completion of a prescribed two-year course of study.

In 1956 such a survey, A College and Its Community, was conducted by the faculty and staff of Montgomery Junior College, assisted by Dr. S.V. Martorana, then Community and Junior College Specialist, United States Office of Education.

Anticipated expansion to a second campus in Rockville focused attention on the need to up-date this report. Under the general direction of Dean Donald E. Deyo, preliminary planning began in Summer 1962, and culminated in data collection and analysis in the Summer and Fall of 1963.

Although Montgomery Junior College exists primarily to provide education for students residing within the County, any realistic study of employment opportunities for these students must survey establishments situated beyond County boundaries. Residents of Montgomery County may seek employment in the District of Columbia or even in a nearby Virginia county. Accordingly, research data were requested and received from employers throughout the metropolitan community, defined operationally as the local service area of the Washington telephone exchange.

The Technical and Semi-Professional Employment Survey was undertaken in order to identify occupational curriculums appropriate for the new Rockville campus of Montgomery Junior College. Almost 100 curriculums were studied in Summer 1962, and from this extensive list of possibilities, 54 regarded as feasible for the Washington area were selected for inclusion in a Questionnaire sent by mail to employers in Summer 1963.

These curriculums fell into four broad categories: Medical Auxiliary Technologies, Business, Applied Science Technologies, and Public Service. The complete list may be found on page 2 of the Questionnaire, which is included in Appendix A along with several blue sheets containing descriptions of all 54 Classifications. These diversified curriculums (or Classifications as they are called in the Questionnaire) have one thing in common: each prepares the graduate for a technical or semi-professional occupational niche. Curriculums ultimately recommended for development as a result of this community survey are discussed in detail in succeeding chapters.

A paragraph from the covering letter which accompanied the Questionnaire presents the definition of "technical and semi-professional" which is used throughout this study:

> "The two-year community college is well adapted to providing 'technical or semi-professional' education. These interchangeable terms refer to a level of skills and understandings intermediate between the engineer or professional--and the vocationally-trained employee. Compared with the vocational, it represents a type of education in which there is less emphasis on manual skills, and much more on supportive academic knowledge and applied science. At the other extreme (from vocational) is professional education, usually requiring at least four years of college, with even less emphasis on manual skills, and even more concentration on supportive theory."

Documented repeatedly has been the urgent need for this intermediate type of education, which prepares the student for the vital role of assisting the scarce professional. A National Aeronautics and Space Administration official, Eugene J. Manganiello, in the September 1963 issue of Technical Education News said,

> "We have no choice but to increase the effectiveness of the engineer through expanded use of technicians.....A trained and experienced technician performs his specialized duties in a far superior manner than would the newly graduated engineer and, in fact, better than a mature engineer.....In recent years, we .....have increased the percentage of technician support and have observed improvements in operations. But we have only begun to exploit the potential use of technicians, and we plan to further expand our current admittedly inadequate ratio of technician to engineer."

Responding to the MJC Questionnaire, a consulting engineering firm said,*

> "The vital, urgent need is for good scientific assistants in all fields. Such persons could well study for a degree in time, and might be found among those who would profit from a full college course but were unable to make the grade financially."

From an aero engineering corporation came this statement:*

> "I would certainly like to personally endorse your proposed educational program for these classes of employees since I believe there is a great national need for training in these categories which will, from a national standpoint, tend to relieve our shortage of professional scientists and engineers."

An aerial surveys firm said,

> "We wish you success in establishing your new curriculum, since we are convinced that junior colleges with two-year terminal courses in the technical and semi-professional education field are greatly needed, not only in the Washington area, but throughout the country."

Although the use of supportive personnel is more institutionalized in engineering-related fields, community acceptance of technical and semi-professional education in the Medical Auxiliary, Business, and Public Service categories is apparent, as indicated by representative statements reproduced below. Expressions of interest and encouragement were found on many returned Questionnaires. For example, a physician said,

> "The college courses provide a very valuable education and I greatly appreciate having its graduates."

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*In quoting from Questionnaires, only firm type is indicated, since responses were guaranteed confidential treatment.

A realty corporation stated,

> "We think this is a fine program and will fill a very definite need in the community as well as being of invaluable assistance to students preparing to enter the business world and various professions."

A professional exchange service said,

> "I am afraid that we could not help your program much with our limited needs but let me commend you for your endeavor. This is something I have felt junior colleges should have done years ago."

A local government office commented,

> "The need for your type of institution is great and rapidly becoming greater."

A federal government office said,

> "We plan to place particular emphasis on recruitment at the junior college level in a wide variety of specific job classifications in the future, and therefore appreciate the opportunity afforded us of participating in this study."

A behavioral science firm said,

> "I and my staff might be available to teach some courses, and/or serve on advisory panels with or without compensation."

A medical research establishment said,

> "We would be interested in conversation or consultation (without charge) if we could be of benefit to your effort, even to a limited degree of teaching or lecturing (without charge)."

Employers stressed their preference for good basic technical education--which may be supplemented as jobs change and technology advances--rather than for highly specific technical education, which is currently valuable, but subject to early obsolescence. From a firm dealing in telemetry receivers and electronic teaching aids came this statement:

> "We are interested in obtaining fully rounded technically oriented electronics technicians. These people should be firmly grounded in all basics rather than be trained toward one particular industry."

Several employers commented on the desirability of including liberalizing courses in the educational programs of technical and semi-professional students. The president of a recreational business concern said,

> "They need to learn to think, both logically and creatively. They need to learn how to solve problems, how to communicate effectively, how to use resource materials of all types, how to resourcefully get things done, rather than invent excuses why it is still undone, and how to plan effectively. They need to acquire the depth and perception that comes through real understanding and enjoyment of the arts: literature, music, dance, symbolic representation and color."

From the office of a Certified Public Accountant came this statement:

> "We are not interested in the accountant who acquires nothing but methodology or who wants to stop his education after Junior College. We have been hiring most of our accountants from the Business Colleges and find their handicap to generally be deficiencies in Academics (particularly English), social graces and personnel adjustments or relationships."

Curriculum decisions responsive to the needs of the business community have value to students attending college part-time as well as to recent high school graduates attending classes full-time. Montgomery Junior College serves an ever-increasing number of adults who do continue their occupational (as well as liberal) education in evening and extension courses.

In Fall 1963 a total of 77 classes was being offered for college credit on the Takoma Park campus as well as four more classes at extension centers. These 77 classes enrolled 1074 students attending only at night, an increase of 34 per cent over Fall Semester 1962. In addition, 245 day students were registered in these evening classes, representing an increase of 94 per cent over Fall 1962. A number of these evening students were registered for more than one class. Meanwhile, total enrollment for the College as a whole had increased 11 per cent, which is only one-third of the percentage increase noted for the Evening Division.

Rapid advances in knowledge and technology portend more continuing education for American professionals and semi-professionals. In the October 1963 issue of Adult Leadership, John Holden, dean of the graduate school of the United States Department of Agriculture and president-elect of the Adult Education Association cited statistics which indicated that "the more education people have, the easier it is to get them to continue their learning." In the November 1963 Harper's, Clark Kerr, president of the University of California said that among the 200,000 students enrolled in the extension sector of his "multiversity" are "one out of every three lawyers and one out of every six doctors in the state."

Conversely, those with the least schooling and thus the greatest need are the least likely to continue their education. For example, according to the Washington Post a recent report from Seymour Wolfbein, director of the Labor Department's Office of Manpower, Automation and Training, showed that

> "while one out of every three unemployed persons failed to go beyond the eighth grade, only about

> 5 per cent of the persons in the (federal) manpower retraining program are below that education level."

The community college is especially well-equipped to serve the continuing education needs of semi-professionals, leaving to four-year colleges and universities the more advanced courses appropriate for supplementing the technical education of the professional. Obviously both groups can and do profit from the wide variety of non-technical courses also offered by the community college.

According to the 1963 Survey, the occupational needs of community employers far outdistance the limited numbers graduating from the few post-secondary technical and semi-professional programs found in metropolitan Washington institutions. Student demand may not be consistent with employer demand for a particular type of education, of course, and thus a new curriculum may fail for lack of sufficient student registration. Unsolved to date in suburban communities with high income and education is the related problem of vesting technical and semi-professional programs with sufficient prestige so that they may be elected without perceived loss of status on the part of the student and his parents.

The rest of this report is presented in a manner which allows the reader to choose his own level of involvement with the actual Survey. For those who wish only the highlights, Chapter II gives both conclusions and recommendations. Chapter III is written for those who are interested as well in a summary of the Survey findings. And finally, Chapter IV contains a detailed analysis of the actual returns, including a series of 17 Charts designed to make these Survey results even more graphic.

CHAPTER II

CONCLUSIONS AND RECOMMENDATIONS

Over the nation the community college is assuming leadership in the preparation of students for future careers in the technical and semi-professional occupations. The need for personnel trained in these fields is an emerging characteristic of our post-war economy. At the same time, the secondary schools and the four-year colleges, both of which reached functional maturity in other eras, now find themselves only partially able or willing to meet these pressing new demands.

It is not surprising that the community college should find it necessary to step into this educational void; its very name is indicative of responsive involvement in community life. Fortunately, as a social institution it is in its vigorous young adulthood at a time coincident with this increasing requirement for technicians and semi-professionals. Consequently, as the community college meets this challenge to educational leadership, this serves further to define and clarify its role as a maturing dynamic colleague among the other institutions of higher education.

Lynn A. Emerson summarized the findings of many observers, and coincidentally those of the 1963 Montgomery Junior College Survey, when he concluded in his recent Technical Training in the United States that,

> "Present output of trained technical personnel falls far short of meeting the needs of industry; and projected needs of industry in the years ahead indicate a widening gap between present facilities and these needs."

The community college has emerged as a "promising source of expansion" in this field, with regard to both pre-employment and adult or continuing education functions. Automation and other technological changes will accelerate involuntary vocational mobility at all levels, so that several occupations in the productive lifetime of one person may become commonplace.

Technical education curriculums found in the catalogs of technical institutes usually are designed to meet these three general requirements:* (1) that the graduate be employable and productive in an entry job after a minimum familiarization period, (2) that he be able to progress to positions requiring increasing responsibility, and (3) that he be prepared to take advantage of future opportunities to advance his technical skills and knowledge. The community college concept of technical and semi-professional education adds a fourth requirement to such curriculums: (4) that the graduate be prepared to live, in the fullest sense of that word.

The fourth requirement is met in the community college by including in every occupational curriculum a substantial number of credit hours in general education courses. Education for technical and semi-professional careers should include not only an excellent grounding in the specific basics, as implied in the first and second requirements, but in addition should be flexible and general enough to permit the third requirement, which will allow considerable vocational mobility with a minimum of re-education, should this necessity arise.

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*Some technical curriculums outlined in the publications of the Technical Education Branch of the United States Office of Education specifically list such requirements.

Within the four broad categories found on page 2 of the Questionnaire (see Appendix A) are "families" of occupational curriculums. For example, Mechanical Technology includes both production and design phases, as well as allied knowledge in instrumentation, quality and cost control, air conditioning and refrigeration, etc. To meet the four requirements noted above, all students in the generic field of Mechanical Technology should master a basic cluster of technical and supporting courses, as well as prescribed general education subjects. Specialization beyond this common core takes the form of options in some colleges. Under such an arrangement, the student matriculated in Mechanical Technology would be responsible not only for the basic cluster of technical subject matter, but in addition would be required to complete courses in one of the available options, such as Engineering Drafting and Design, or Instrumentation, before he would be eligible for the associate degree.

If the generic curriculum (Mechanical Technology in this example) has been flexibly designed to lead into more than one option, a second specialization may be pursued later through part-time continuing education, should this be dictated by technological change, by an employment market reflecting automation, or by personal preference.

The two-year curriculum is geared to meet the pre-employment needs of full-time day students. Employed part-time evening students, with educational backgrounds ranging from high school graduation through the doctorate, may have neither the time nor the inclination to complete an entire curriculum. Where the demand is sufficient, sequences of courses with varying numbers of credit hours have been developed by some institutions for those part-time students (or their employers) who are especially interested in a "package" of related knowledge which has been carefully planned by the College faculty and knowledgeable laymen for the accomplishment of some occupational objective.

Technical and semi-professional education tends to be costly. Lynn Emerson gives these capital and operating cost estimates in the conclusion of his previously quoted study:

> "Capital outlay costs for post secondary technical training programs of good quality is estimated at from $3000 to $4000 per full-time student.
>
> "Operating costs for post-secondary technical programs vary widely in different institutions. The cost of a quality program is estimated at $800 per year per full-time student."

A smoothly functioning system of occupational education requires an operating budget for Student Personnel Services which is sufficient to permit continuous liaison with both the feeder high schools and the local employers. Ideally but expensively this involves individual attention to each interested student (by high school or college counselors) from about the sophomore year in secondary school through community college graduation and placement in an occupation, and perhaps in continuing education beyond that.

Accurate assessment of the educational progress as well as the educational deficiencies of potential technical and semi-professional students is necessary before the most appropriate program for the individual student can be planned. As guidance personnel have more time for individual counseling aimed at evaluating and increasing the academic effectiveness of all students, this in turn will bring counselors into a closer working relationship with the academic faculty, and thus may have a salutory effect on enhancing the mutual respect of these two branches of the faculty, to the obvious advantage of the student body.

According to the 1963 Manpower Report of the President, the fastest growing major occupational group has been the professional and technical, with "a rate of employment growth more than three times the average of all occupational groups." To date, these occupations have benefited from automation and related technological change; some sectors of the labor market have been less fortunate. As far back as 1956, the total number of white collar workers exceeded those in the blue-collar or manual occupations. Specifically with regard to technicians, the Manpower Research Bulletin #1 issued by the United States Department of Labor in May 1963 states,

> "Technological changes have occurred with such rapidity in recent years that the supply of technical manpower has failed to meet the need for it. At present, the number of technicians employed as supporting personnel is approximately three-fourths the number of engineers and scientists. It has been estimated that within a few years, an average of two to three technicians will be needed for each engineer. The Bureau of Labor Statistics estimates that 800,000 additional technicians will be needed by 1970, not including replacement requirements."

Similar figures showing current and future requirements for technicians and semi-professionals have become commonplace in the manpower literature. As with the 1963 Montgomery Junior College Survey, however, their repetitive message tends to obscure a basic and unsolved problem:

no matter how urgent the demands of employers, the establishment of occupational curriculums alone will not increase the supply of technicians, for the unit of supply is the student, and not the curriculum.

At present the occupational curriculum tends to be a second choice for both the student and his parents, and this value judgment is corroborated by the attitudes of many high school teachers and guidance counselors. Particularly in an area with high levels of income and education, the first choice continues to be the pursuit of a traditional college education. While the occupational curriculums may have the enthusiastic support of community leaders, the clear understanding is that this choice is for "other peoples children."

All too often the high school vocational program has become the dumping ground for students lacking sufficient intelligence, knowledge, or motivation to be successful in the more demanding academic subjects. Through a type of "guilt by association", technical curriculums have tended to acquire this stigma, which contains a basic error: the student who cannot succeed in college preparatory subjects by and large is also a poor risk for technical and semi-professional curriculums at the junior college level. This is especially true in the applied science fields, where some proficiency in mathematics is a prerequisite skill.

Recruitment of Montgomery County high school students into occupational curriculums at the College will remain an unsolved problem of supply and demand until it is recognized as one worthy of solution by educators, parents, and employers.

It is recommended, therefore, that consideration be given to the appointment of a committee to review this situation, with membership representing among others the secondary schools, the Junior College, the Montgomery County Council of Parent-Teacher Associations, the State Employment Services, and the local Boards of Trade, which include both private and federal government establishments.

Both tangible and intangible factors need to be studied, and an action program suggested in order to ameliorate specific difficulties made apparent by the accumulated evidence. "Tangible factors" would include data such as salary schedules comparing entrance rates for high school and community college graduates. Attitudes of parents and peer group leaders reflecting their image of occupational education would be examples of intangible factors."

The genuine interest expressed by area employers as well as their numerous offers of assistance have been most gratifying. Recognition beyond the school system of the central importance of equalizing the acceptability of the technical and semi-professional career is a necessary step toward the eventual solution of this persistent problem.

A March 1963 staff report from the American Institute of Physics included this statement:

> "Making present technicians conscious of the dignity and importance of their work is the best single measure--after provision of adequate salaries--for recruitment of future technicians."

The identification of occupational curriculums for development at the new Montgomery Junior College campus in Rockville was the original objective of this Survey. Intensive research over the period of a year into the problems and possibilities of technical and semi-professional education has resulted in a broadened conception of this purpose. To enumerate a bare list of curriculums for addition is not enough. Just as the community college over the nation has assumed leadership in the preparation of students for these types of careers, Montgomery Junior College has come to recognize a responsibility in helping to develop a total program of technical and semi-professional education for the entire County. The recommendations which follow therefore reflect not only the findings of the 1963 Survey, but in addition an awareness of these educational possibilities in the rest of the unified school system.

MEDICAL AUXILIARY TECHNOLOGIES

Survey results indicated that several Medical Auxiliary Technologies, if offered as two-year college programs at Montgomery Junior College would fulfill genuine educational needs in the metropolitan Washington area.

Medical Technology and Medical Secretarial already are well-established Classifications at the College. The former is a transfer curriculum, preparing graduates for the third year of upper division courses, and for an additional twelve-month clinical period in a hospital school approved by the Council on Medical Education and Hospitals of the American Medical Association. Students completing this four-year program are eligible for the examination given by the Registry of Medical Technologists of the American Society of Clinical Pathologists.

A five-year grant from the United States Public Health Service made possible the employment of a Dental Assisting director who in turn successfully planned and developed the Dental Assisting program at Montgomery Junior College. National manpower projections for the dental profession indicate that Dental Assisting is destined to be a growing supportive occupation. The number of job openings estimated by respondents for the next five years is triple the number of those currently employed by these same respondents.

The need for bedside nurses in the Washington area has been amply demonstrated, along with the willingness of the health-care institutions to employ graduates of an associate degree program leading to the state licensing examination.

Almost 90 per cent of these responding employers felt that a two-year program was sufficient to meet their job requirements. Associate degree nursing education is similar in many respects to four and five-year baccalaureate programs, and to three-year hospital school diploma programs, and yet different in other important aspects. The basic nursing theory and practice is found in all three types of educational institutions and includes nursing fundamentals, obstetrics and pediatrics, medical-surgical, and psychiatric nursing. The Western Council on Higher Education for Nursing has summarized a major difference with this statement: the associate degree nursing program is "designed for the education of individual students rather than to meet the service needs of hospitals." The complete program, with related clinical experience, encompasses two academic years and includes a substantial number of general education courses, in keeping with the philosophy of the community college.

Licensed practical nurses are urgently needed in the metropolitan area. At the same time, this is a curriculum more appropriate for the vocational offerings of the secondary schools where as a less-than-college level program it would be eligible for George-Barden reimbursement. A prior attempt to add this curriculum at the Junior College failed for lack of student enrollment, although the 1956 Survey also showed a demand for such graduates in the Washington community.

While the demand for Psychiatric Aides seems to be growing, again this need could be met by a federally reimbursable vocational program in the high schools. Crystallization of the functions of this Classification as a distinct occupation may come in time, and with it may bring higher status and remuneration. Since three-quarters of the responding employers said they would hire men as well as women if both were available and comparably trained, the Psychiatric Aide could be developed as a secondary school curriculum enrolling both boys and girls.

BUSINESS AND PUBLIC SERVICE

For future administrative purposes, Classifications in the Business and Public Service categories will be combined, and thus they are considered as a unit in this chapter on conclusions and recommendations.

The Secretarial Classification is as old as the College itself. The demand for these students is so great that it is difficult to keep them in college long enough to complete the associate degree requirements when the lure of lucrative jobs prior to graduation is so tempting. To meet the needs of legal and technical secretaries, an additional course in dictation, transcription, and vocabulary, for each of these two specialities is suggested, although neither course is deemed necessary immediately.

The Classifications of Executive Administrative Aide and of Personnel Management registered relatively high counts of current and future job demand. The development by the College faculty of planned sequences of Evening Division courses to serve these particular occupational requirements is suggested for the period following the opening of the new campus in Rockville.

The College curriculum currently includes General Business Management (Small Business Administration on the Questionnaire) which will require some reorganization by the faculty in order to make it truly occupational. At present it functions as a temporary expedient for the student whose past record will not allow him to matriculate in the transfer curriculum of his choice--Business Administration. The Accounting Classification, which registered substantial current and anticipated job demand, could be regarded as an option under General Business Management. However, the rapid emergence of Accounting as a branch of Electronic Data Processing may dictate that this Classification be functionally attached to the latter curriculum.

The three Classifications of Real Estate, Police Training, and Recreational Leadership registered considerable community demand. To meet these needs, the development of sequences of appropriate courses, rather than of curriculums _per se_ is suggested. A six credit hour course at the College now forms something of a sequence in Insurance. This course has been approved by the Maryland Commissioner of Insurance, and is consistent with requirements for the State licensure examination. The Evening Division would be the logical place to offer such sequences of courses when they are eventually planned by members of the College faculty, together with the respective lay advisory committees.

Library Assisting registered a current job demand of about 500 persons, with the same number of job openings predicted for the next five years. With the new Instructional Materials Center for a campus laboratory, little additional capital outlay would be required to make this curriculum operative. On the other hand, a conservative approach is recommended, since there does not exist to date a definitive body of knowledge leading to the associate degree in this field. The 26 respondents currently employing Library Assistants represented a range of business types, where those in this Classification apparently performed rather diverse functions.

Although the responding firms registered considerable current and anticipated job demand for both the Food Management and the Institutional Food Service Management Classifications, neither of these is suggested for development in the immediate future. In spite of the fact that "thumb-nail" descriptions of the Classifications accompanied every Questionnaire (see Appendix A), comments from employers indicated that these two rather different fields were viewed as one by some respondents. Since at least one is a curriculum requiring substantial amounts of both space and equipment, additional study is suggested prior to any further planning.

APPLIED SCIENCE TECHNOLOGIES

Electronic Data Processing is already an associate degree curriculum at Montgomery Junior College. Reevaluation by the faculty is indicated in the near future in order to take advantage of the newer approaches in this rapidly developing field. Two options are suggested: Business Data Processing, and Research and Development Data Processing. Electronic accounting procedures would form an important part of the former option.

Theoretically the use of data processing equipment at off-campus installations provides adequate associate degree education in this field; practically it leaves much to be desired unless a carefully planned and administered cooperative program can be organized. It is likely that the data processing laboratory should be expanded as a campus facility at Rockville. Electronic information processing even now so permeates the business and research world that the time may come when most technical and semi-professional curriculums will need to include at least some familiarization with data processing.

Mechanical Technology is recommended for development by the time the new campus opens in Rockville, with particular emphasis for the present on only one of the suggested options: Engineering Drafting and Design. Another option to be considered for the future is Instrumentation Technology. Any planning for the more usual Production option in Mechanical Technology should await further evidence of need in this particular community.

Laboratory facilities which would give students the variety and quality of experience needed are costly, albeit necessary. The laboratory is an integral part of such a program, in order that there be constant application and reinforcement of theory with practical application, which in spiral fashion then contributes in turn to the understanding of more complex theory.

Survey results showed unusually high current and anticipated future demand for the Electronic Technology Classification. The technical and supporting subjects making up this curriculum have much in common with those found in the Electrical Technology curriculum, which is already offered at Montgomery Junior College. It is recommended that both programs be available to students, with Electrical Technology offered as an option for those who prefer this to further specialization in Electronic Technology per se. There was a considerably stronger community demand for the Electronic Technology.

Electronics is already taught in the County secondary schools. These students receive the first two years of this curriculum in high school, and an additional two years at the Junior College. Thus this type of program has been designated "11-14". The first group of such students graduated from high school last June and are currently enrolled in the existing Electrical

Technology curriculum at Montgomery Junior College.

Equipping an electronics laboratory can be very expensive. Transfer of some equipment from the Takoma Park facility will reduce this total cost somewhat. Also, the current availability of some standard quality testing and measuring instruments in kit form can effect considerable savings and as well provide the students with valuable learning experience in assembling this equipment.

Since printing is the largest single industry in the Washington metropolitan area, it is not surprising that this Classification registered the largest number of job openings reported by respondents for the next five year period.

One employer commented, "Washington is bereft of qualified trainees in printing production, management, and sales, as well as the purely technical skills of press operating, camera work for lithography, stripping of negatives and machine composition." Another said, "No school, public or private, in this area (including D.C.) offers a good comprehensive course in either commercial art or photography."

Printing and Graphic Arts is suggested as a new curriculum, with three options: Production and Management, Photography, and Art--Advertising. At present the latter may be found in the catalog as one of the Fine Arts curriculums. This Art option would be more functional for this purpose were it revised by the faculty to include some work in technical illustration, which is one of the special demands in this community.

Civil Technology is recommended as a new curriculum for development on the Rockville campus, with the understanding that this, too, can be an expensive equipment program. On the other hand, as one respondent pointed out, the principles involved in operating the simpler and less expensive instruments do not differ markedly from those involved in the operation of the most expensive equipment, and would suffice with a brief on-the-job familiarization period following graduation. Since to an increasing extent mapping involves "the input of data directly from photogrammetric stereoplotting instruments into computing machines", this is another curriculum which should include some familiarization with electronic data processing.

Options of Cartography, Photogrammetry, and Highway Design are suggested for the Civil Technology curriculum. Cartography is already offered in the County secondary schools.

Two Classifications with relatively high current and anticipated future demand were Chemical Technology and Pure Science Technology--Biology, Chemistry, Physics. In this geographic area, the laboratory rather than the industrial aspects of Chemical Technology would be stressed. The Pure Science Technology is envisioned as an interdisciplinary effort, preparing the graduate to work directly with scientists in the physical and life sciences.

Recently the American Institute of Physics conducted a conference and gathered additional information about the recruitment and training of technicians in physics. To meet their requirements, this professional group favored the technical education available in a strong two-year program, rather than in a four-year college curriculum. Likewise, 80 per cent of the member companies responding to a recent survey conducted by the Manufacturing Chemists' Association favored "a formal two-year college course designed for chemical technicians."

The interdisciplinary Pure Science Technologist would have a working knowledge of physics and chemistry as well as concentrated exposure to biology and the related mathematics. Working out the delicate balance of these four subject areas within the two-year span of an associate degree would be a complex task for the applied science faculty, but the end product obviously is in demand in the Washington area.

It is suggested that the generic curriculum encompassing these two Classifications be designated as Science Technology, with two options at present: Chemical Technology, and the integrated Pure Science Technology. At a later date it is possible that Radiation Technology could become a Science Technology option.

Radiation Technology currently is offered as a curriculum at Montgomery Junior College. An Atomic Energy Commission grant will allow the employment of a coordinator for this program as of January 1964, under whose guidance matters of curriculum refinement, student recruitment, and eventual placement of graduates will receive attention.

The need for Technical Report Writers was stressed by a number of respondents, who usually emphasized the need for knowledge of content as well as facility with communication. This Classification is recommended for inclusion in the College offerings as a course, which would form a unit in most of the technical and semi-professional curriculums.

Earlier in this chapter the 11-14 program in Electronic Technology was discussed. It is suggested that three other existing or recommended curriculums also be studied with a view toward 11-14 arrangements with the secondary schools: Printing and Graphic Arts, Civil Technology, and possibly Electronic Data Processing.

One of the problems inherent in the 11-14 arrangement occurs because the students entering the College following completion of the high school phase are ready for more advanced technical courses than are the other entering freshmen, making necessary either two "tracks", or else some form of advanced placement. The former is feasible only when the supply of such students from the secondary schools justifies the establishment of a second track, and the latter requires the development of placement examinations or procedures by the College faculty. Especially with these 11-14 students, the time may come when advanced standing (college credit as well as placement in an advanced course) may be available to entering freshmen who complete such placement examinations with distinction.

The Early Placement program has been in operation for almost two years in the Montgomery County school system, but few students have been admitted in technical subjects. Especially in the heavy (and expensive) equipment curriculums, the College could function as a quasi area technical center to the extent that superior high school seniors were encouraged to enroll in one or more of these College courses on an Early Placement basis.

In summary of this chapter, the new curriculums or options listed in Table I have been recommended for development to coincide with the opening of the Rockville campus of Montgomery Junior College.

TABLE I

CURRICULUMS	OPTIONS
Nursing, Associate Degree R.N.	--
Electronic Data Processing	Business Data Processing Research and Development Data Processing
Civil Technology	Cartography Photogrammetry Highway Design
Mechanical Technology	Engineering Drafting and Design (Instrumentation--for later development)
Electronic Technology	Electronic Technology Electrical Technology
Printing and Graphic Arts	Production and Management Photography Art (Commercial and Technical)
Science Technology	Chemical Technology Pure Science Technology (Biology, Chemistry, Physics)*

---

*Representatives of some offices and agencies in the community were contacted not as employers but as knowledgeable persons with regard to one or more of the Classifications under consideration. Such a letter went to the Civil Service Commission, asking among others this question:

> "Which of the 54 listed Classifications (or curriculums) currently lead to specific Civil Service positions and ratings?"

Each of these recommended curriculums (or an option) was designated by the responding officer as one which "could lead to a specific civil service position."

In addition, several sequences of courses for the Evening Division have been suggested, especially as a service to the part-time student: Executive Administrative Aide, Personnel Management, Real Estate, Police Training, and Recreational Leadership. Representatives of the local real estate and police training interests already have taken preliminary steps toward working out such programs with the College. In all likelihood these sequences will be the first developed, with the others following as need dictates.

Finally, three new courses have been identified for faculty consideration: Technical Report Writing, and dictation, transcription, and vocabulary for legal and for technical secretaries. It has been suggested that the former course be incorporated into most of the technical and semi-professional curriculums, and that the latter two eventually be offered in the Evening Division of the College.

Before final decisions can be made with regard to curriculum development, it will be necessary to survey the projected career plans of Montgomery County senior high school students, especially as they relate to the technical and semi-professional occupations. No matter how great the demand by employers, curriculum development is a meaningless exercise if students do not elect to enroll.

These data will be collected and analyzed in the very near future. Along with continuing fiscal considerations, conclusions reached from these results should furnish the evidence on which to base final decisions about the establishment of new technical and semi-professional curriculums on the Rockville campus.

Alvin Eurich, vice president of The Fund for the Advancement of

Education, recently said that innovations which occur in college teaching tend to come from sources outside the colleges, such as national affairs, intellectual currents, and broad social forces. Outside the colleges, widespread changes in both technology and organizational patterns of the work force are taking place. These seem destined to have their influence on the curriculums and instructional patterns of the community college, particulary at this growing edge of higher education--the preparation of graduates for technical and semi-professional occupations.

CHAPTER III

SUMMARY OF FINDINGS

Metropolitan Washington is an atypical employment market in that the major "industry" is the federal government. Satellite to this focal point are numerous private firms which have mushroomed in the last decade to assist with the increasingly complex research and development and scientific needs of this the headquarters and control center of the nation.

The demand for technical and semi-professional personnel to support the ubiquitous professional is nowhere more apparent than in such a community. In addition, the variety of skills required for this range of ancillary roles has curricular implications for the community college attempting to educate students for effective entry into the Washington labor market. The Montgomery Junior College Survey gave area employers the opportunity to register current employment patterns and future estimates in each of these four categories: Medical Auxiliary Technologies, Business, Applied Science Technologies, and Public Service.

Respondents participating in the 1963 Survey numbered 551 firms, employing a total of 153,886 employees, who in turn constituted about one-fifth of the 1960 total work force resident in the metropolitan Washington area.

Four hundred and seven of these establishments participated in response to a mailing sent to a 10 per cent random stratified sample selected from 534 categories in the telephone company's Yellow Pages. These categories were chosen to include as far as possible all business types presumed to be interested in technical and semi-professional education. Response from what has been designated as Group I (the random stratified sample of essentially private firms) did not exceed 10 per cent. In addition, these 407 responding firms employed only 32,221 of the 153,886 total work force found in the establishments of all Survey respondents.

One hundred forty-four of the 551 establishments participated as part of a selected sample of public and private establishments known from available evidence to employ considerable numbers of technical and semi-professional personnel. Types of firms making up this Group II are listed in Table II. Requests for participation went out to 238 such establishments; 144 or 60 per cent responded. Together they accounted for 121,665 or 79 per cent of the persons currently employed by all the Survey respondents.

Numerical results from Group I and Group II employers were combined for the purpose of this investigation, which was the identification of each occupational curriculum "which if offered as a two-year college program at Montgomery Junior College would fulfill a genuine educational need in the metropolitan Washington area." As strictly defined, this does not constitute a statistical study, and no attempt should be made to generalize about the total technical and semi-professional needs of the metropolitan Washington community from this combined random and selected "sample". At the same time, the evidence indicates that those who did participate in this Survey comprise a principal market for the potential graduates of these

TABLE II

Categories of Respondents	Potential Respondents (Firms Sent Questionnaire)	Percentage Response	Actual Respondents (Firms Returning Questionnaire	Percentage of Total Number of 551 Actual Respondents	Number of Persons Currently Employed by Respondents	Percentage of Total Persons Currently Employed by Respondents
Group I Random Stratified Sample from 584 Standard Heading Groups in Yellow Pages	4,681	8.7%	407	73.9%	32,221	20.9%
Group II Selected Sample from	238	60.5%	144	26.1%	121,665	79.1%
A. R & D firms, public and private	202	58.9	119	21.6	73,218	47.6
B. Local governments, including schools and libraries	18	77.8	14	2.5	29,954	19.5
C. Other federal government offices	13	53.8	7	1.3	17,316	11.2
D. Other private firms (hospitals and schools) not in random sample	5	80.0	4	0.7	1,177	0.8
Totals			551 firms	100.0%	153,886 currently employed	100.0%

proposed technical and semi-professional curriculums.

About half of the responding firms were located in the District of Columbia, along with about the same percentage of the total employees. Approximately one-third of the respondents listed a Maryland business address, and together employed about one-third of the total number reported.

By virtue of the way in which the Group II sample was selected, the largest numbers of employees were found in two major categories of business: Public and Quasi-Public Services, and Research and Development. Together they accounted for 86 per cent of the total of 153,886 persons employed in all 551 responding firms. Although more than half of the responding establishments employed less than 25 persons, the modal work force category for all of these firms included from 1001 to 5000 employees.

MEDICAL AUXILIARY TECHNOLOGIES

Employers responding to this Survey left no doubt that some Medical Auxiliary Technologies if offered as two-year college programs would fulfill a genuine educational need in the metropolitan Washington area. One of the large hospitals made this statement:

> "There is a great community need for expansion of educational opportunities for personnel to be prepared for a great number of hospital positions. The hospitals in the District as well as surrounding counties offer not only many but very rewarding opportunities for adequately prepared personnel. Any efforts made by your institution to meet the need will not only be a service to your students but to the health-care institutions."

The greatest numbers of trained personnel were currently employed or would be needed in the next five years in these fields: Licensed Practical

Nursing, Associate Degree Nursing, Medical Secretarial, Medical Technology, and Psychiatric Aide.

About 90 per cent of the respondents felt that two years of specialized college training was sufficient for entry into the first three of these listed Classifications; about 60 per cent had the same opinion concerning the latter two.

Approximately 20 per cent of the establishments responding about Medical Technology conducted organized training for this Classification. Such programs were not available even to this extent for the other four Classifications listed above.

Very few of the persons currently employed in these Medical Auxiliary occupations were recruited directly from the junior college level. About one-third of both the Medical Technology and the Medical Secretarial Classifications were recruited by up-grading present employees. Three-quarters or more of the respondents felt that Medical Technology, Nursing, and Psychiatric Aide should be regarded as "hard to fill". Practical Nursing was viewed as the least difficult to fill of this selected group, and even in that case one-half of the employers described this as a "hard to fill" position.

Approximately three-quarters of the responding employers would hire either men or women for the Medical Technology and Psychiatric Aide Classifications. About one-third found either sex acceptable for both kinds of Nursing.

BUSINESS

The need for secretaries in this area requires no further substantiation, although a number of employers made it clear that they were in the market not just for secretaries, but rather for competent, accurate, willing secretaries.

In addition to Secretarial, these Classifications reported the largest numbers of either currently employed or anticipated job openings for the next five years: Accounting, Electronic Data Processing--Business Applications, Food Management, Executive Administrative Aide, Real Estate, Institutional Food Service Management, and Personnel Management.

With the exceptions of Food Management and Accounting, each of these Classifications was regarded as "hard to fill" by 60 per cent or more of the responding employers. In these two cases, 50 per cent and 40 per cent of the employers were of this opinion.

At least 80 per cent of the respondents for every one of these selected Business Classifications indicated that a person with two years of specialized college training would satisfy their job requirements. Organized training programs for these types of Classifications apparently are scarce in the Washington area. The exception was for Real Estate, where half of the establishments reported organized training.

One-half or more of those currently employed were recruited by up-grading in these Classifications: Executive Administrative Aide, Personnel Management, and Institutional Food Service Management. Except for Real Estate, all of the other selected Business Classifications recruited between 25 and 50 per cent by up-grading present employees. These respective percentages have implications for continuing education as well as for pre-employment education at Montgomery Junior College.

The junior college level currently is a direct recruitment source of relatively few persons employed in these Business Classifications. About one-quarter of the Secretaries and one-fifth of the Institutional Food Service Management groups came directly from high school. The university or college contributed even smaller percentages into direct employment in these selected Classifications.

With regard to sex preference for employees, respondents for the most part indicated willingness to hire either men or women, if available and comparably trained. Some 60 per cent of the employers preferred female secretaries.

APPLIED SCIENCE TECHNOLOGIES

Twelve of these 21 Applied Science Technologies registered current or anticipated job demand suggesting that each was a Classification which if offered would fulfill a genuine educational need in the metropolitan Washington area.

In this selected group of Classifications, the estimated number of job openings for the next five years ranged between 184 for Photography to 3264 for Printing and Graphic Arts. In descending rank order of this five-year demand were Printing and Graphic Arts, Electronic Technology, Engineering Drafting and Design, Civil Technology, Research and Development Electronic Data Processing, Pure Science Technology (Biology, Chemistry, Physics), Chemical Technology, Mechanical Technology, Technical Report Writing, Instrumentation Technology, Electrical Technology, and Photography.

Together the employers giving these estimates expected to have a total of 10,139 job openings in these twelve Classifications during the next five years, or about 2000 positions per year. These same respondents already employed or listed vacancies for 8,874 employees in these Classifications. Thus an increase of 14 per cent was predicted over the next five years. Five-year estimates included both turnover and the addition of new positions.

Approximately 50 per cent or more of the respondents found each of these twelve Classifications "hard to fill." Seventy per cent or more of the employers indicated that a person with two years of specialized college training would satisfy their job requirements in the respective Classifications.

Twenty to 30 per cent of the employers in the following Classifications reported organized training programs for them: Civil Technology, Mechanical Technology, Electrical Technology, Electronic Technology, and Research and Development Electronic Data Processing. Even fewer organized training programs were available for the other seven selected Classifications.

At present direct recruitment from the junior college level is of little numerical consequence except in the fields of Chemical Technology and Pure Science Technology, where both percentages were equal to about one-fifth of those currently employed. Direct recruitment from the high school was most apparent in Civil Technology (42 per cent), Photography (23 per cent), and Printing and Graphic Arts (32 per cent). Currently the respondents for none of these Classifications employed very many directly from university or college, with the possible exception of Pure Science Technology. In this latter case the three types of educational institutions furnished for direct recruitment these percentages: high school, 15 per cent; junior college, 17 per cent; and university or college, 16 per cent.

Several of these Classifications had significant percentages recruited by up-grading: about 90 per cent of those in Electrical Technology, and approximately one-third of those currently employed in Printing and Graphic

Arts, Chemical Technology, and Electronic Technology. Noticeably lower percentages of recruitment by up-grading prevailed in the other nine selected Classifications.

Responding employers in a rather surprising number of these selected Applied Science Technologies expressed a willingness to employ women as well as men if available and comparably trained. The number of employers answering "both" to Question 8 on page 3 of the Questionnaire fell below 50 per cent in only three Classifications: Mechanical Technology (27 per cent), Instrumentation Technology (48 per cent), and Electrical Technology (37 per cent).

PUBLIC SERVICE

Three of these Classifications stand out when estimates of job openings for the next five years are considered: Law Enforcement--Police Training, Library Assisting, and Recreational Leadership. These estimates are more than matched by current employment figures for the first two Classifications, but not for Recreational Leadership. The difference of over 800 between this five year estimate of job openings (991) and the number of currently employed plus vacancies (138) probably reflects the high rate of turnover expected yearly in Recreational Leadership, which is a permanent career for relatively few of those who function in this capacity during any one year.

About half of the respondents for Library Assisting felt that this Classification was "hard to fill." Approximately 40 per cent held this opinion about Law Enforcement and Recreational Leadership. Some 60 per cent of those employing within the Law Enforcement Classification conducted an organized training program. About 9 out of 10 of the responding establishments for these three selected Classifications considered two years of specialized college training satisfactory for their requirements.

In terms of direct recruitment from a specified type of educational institution, the junior college level was the heaviest contributor to the Recreational Leadership Classification. From the university or college level both this and the Library Assisting Classification directly recruited about 20 per cent of those currently employed. Also, about the same numbers in these Classifications were recruited by up-grading present employees. Most employers in Recreational Leadership and Library Assisting indicated a willingness to hire either men or women, but this proportion fell to 20 per cent of those employing in the Law Enforcement Classification.

TABLE III lists the Classifications which have been selected for

TABLE III

MEDICAL AUXILIARY TECHNOLOGIES

Medical Technology
Medical Secretarial
Nursing, 2 Year RN
Nursing, Licensed Practical
Psychiatric Aide

BUSINESS

Secretarial
  (General, Legal, Technical)
Executive Administrative Aide
Personnel Management
Electronic Data Processing--
  Business Applications
Real Estate
Food Management
Institutional Food
  Service Management
Accounting

APPLIED SCIENCE TECHNOLOGIES

Civil Technology
  (Cartography, Photogrammetry,
  Highway Design)
Engineering Drafting and Design
Mechanical Technology
Instrumentation Technology
Electrical Technology
Electronic Technology
Research and Development
  Electronic Data Processing
Photography
Printing and Graphic Arts
Technical Report Writing
Chemical Technology
Pure Science Technology
  (Biology, Chemistry, Physics)

PUBLIC SERVICE

Law Enforcement (Police Training)
Library Assisting
Recreational Leadership

detailed analysis in this summary chapter on the basis of both current job demand and anticipated openings for the next five years.

Survey results given in Chapter IV indicate that about one-quarter of the responding firms would be interested in working with Montgomery Junior College in setting up an educational program which would enable their technical and semi-professional employees to earn college credit. Several private and public respondents noted the fact that some of their employees already were attending Montgomery Junior College under some type of educational assistance plan.

If even 10 per cent of the establishments expressing an interest in Cooperative Work Experience eventually arranged a program with the College, such summer, part-time, or full-time learning experiences would be available to the students in about a dozen firms.

Because of the complex nature of the organization and administration of Cooperative Work Experience Programs, few could be expected to materialize, regardless of how willing both parties to such an arrangement might be.

CHAPTER IV

SURVEY FINDINGS

This chapter reports the findings from the 1963 Montgomery Junior College Survey. Below are a few highlights, taken directly from the pages which follow:

"The evidence shows that with most of these Classifications, two years of specialized college training would satisfy the job requirements of employers. This is some indication that these curriculums are indeed appropriate for the two-year college."

"About one in every six jobs in these responding firms was of this intermediate or assisting type."

"In the firms of these 551 employers, the anticipated five-year demand was greatest for the combined Applied Science Technologies, with Business Classifications in second place."

"Applied Science and Medical Auxiliary Technologies were more often considered 'hard to fill' than were the other two types of Classifications."

"Some employers in every one of the 54 Classifications indicated a willingness to employ either men or women."

Respondents included 551 firms, employing 153,886 persons. These respondents came from two principal sources: (1) Group I--a random stratified sample utilizing 534 appropriate heading sections from the telephone company's Yellow Pages; and (2) Group II--a selected sample composed of (a) most of the private and federal government research and development establishments listed in the 1962 edition of the Metropolitan Washington Board of Trade's publication Scientific Resources in the Washington D.C. Area; (b) local government offices, including schools and libraries; (c) several other large federal government offices; and (d) other private firms (hospitals and schools) not included in the random sample from the Yellow Pages (see Table II on page 31).*

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*Preliminary exploration with certain federal officials in Summer 1962 indicated that a complete list of all public and private establishments in the metropolitan area would not be available to the College. Without access to such data, the selection of one overall random stratified sample of employers was not possible. Such a sample would have permitted statistical inference about the entire group of employing establishments. The next best alternative appeared to be the use of two types of samples, one random (Group I) and one selected (Group II), but both drawn from broad categories of establishments whose types of business gave some indication of potential interest in technical and semi-professional education.

The Standard List of Headings published by the telephone company as a guide to their classified Yellow Pages provided the categories for the random sample. The Yellow Pages includes a large proportion of private establishments in the metropolitan area, stratified by business type. It does not give comparable access to a similar stratification of the many public offices and installations, which for the most part are simply listed alphabetically in the non-classified section of the telephone book. As noted above, selected local and federal government establishments were nevertheless invited to contribute Survey information.

Actual establishments making up a 10 per cent random stratified sample from the Yellow Pages were chosen by use of a Table of Random Numbers, to insure that each firm within a given Standard Heading had an equal chance of being chosen.

Random selection of some four thousand Group I establishments and the subsequent data collection proceeded at considerable expense of time and (cont'd)

Group I above included 407, or 74 per cent of the total number of 551 responding firms, but only 21 per cent of the 153,886 employees currently found in all of these surveyed firms. Group II contained 144, or 26 per cent of the 551 respondents, but more importantly, contributed four-fifths (121,665) of these 153,886 employees. Together Group I and Group II respondents employed a number of persons equal to about one-fifth of the total employed residents reported for the Washington metropolitan area by the United States Census in 1960.

Figures which follow in this chapter are accumulated from respondents in both Group I and Group II. The findings are literally the current employment patterns and practices and the estimated needs of respondents to the Questionnaire. Thus in the strict sense, this is a descriptive rather than a statistical study, although the description is basically numerical.

Statistical logic dictates that the returns from neither Group I nor Group II respondents (alone or combined) be inflated to provide a hypothetical estimate of the total technical and semi-professional employment picture in the Washington community. Percentage returns from Group I were

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*(Cont'd) money. However, this procedure was deemed necessary in order that a carefully chosen sample of these employers throughout the community might be given the chance to indicate occupational needs in specific technical and semi-professional fields.

Some did take advantage of this opportunity to respond; many more did not. Guessing at the meaning of non-response is hazardous, but in view of the phrasing of the first instruction on page one of the Questionnaire (see Appendix A), non-response could indicate not only the usual apathy or lack of time, but also a considered lack of need for employees educated in these areas.

Types of establishments listed under Group II above were surveyed as a result of the hypothesis that such firms comprise a principal market for technical and semi-professional employment in the Washington metropolitan area.

adjudged inadequate to warrant generalizations about this population of employers. The percentage response from Group II was much greater, but these employers had been deliberately selected (rather than randomly chosen) and thus furnished no basis for statistical inference, no matter how valuable the information provided by their responses in the identification of curriculums appropriate for development.

Charts presented in this chapter illustrate two basic kinds of information: (1) counts of people (e.g., current and estimated future employment figures); and (2) counts of pertinent practices or opinions (e.g., "Is this a 'hard to fill' job?" or "Does your establishment conduct an organized training program for this Classification?"). "Counts of people" provide some indication of relative demand for the various proposed curriculums. It is understood that such figures are descriptive of only these 551 firms, (albeit they account for about one-fifth of the area's employees), and thus represent less than the total demand in the community for a particular Classification. "Counts of pertinent practices or opinions" of firms, although again descriptive of only the responding establishments, nevertheless provide valuable insights about the operational inclinations of this important group of employers of technical and semi-professional students.

It is virtually certain that the inclusion of more firms from the metropolitan area's total number would have increased the "counts of people" given in the following charts; in most cases it is less certain that the inclusion of more firms would have changed significantly the percentage distribution of responding firms answering in the affirmative or the negative about a particular practice or opinion.

LOCATION OF RESPONDING FIRMS IN METROPOLITAN AREA

Montgomery Junior College is a community college serving the educational needs of Montgomery County residents. In keeping with this objective, firms beyond the County boundaries and throughout the metropolitan Washington area were surveyed, since many of the County students will seek employment in contiguous jurisdictions.

Chart I shows the distribution of responding firms in Maryland, Virginia, and the District of Columbia. About one-third of them have business addresses in Maryland, slightly more than half in the District, and the other 14 per cent in nearby Virginia.

This chart also shows the geographical distribution of respondents according to the total number or persons currently employed. The 167 firms in Maryland contributed 58,336 of this total. Virginia respondents employed 15,444 persons, while the 298 District of Columbia respondents employed 80,103, or just over half of the aggregate number of 153,886 currently employed by all 551 respondents.

SIZE OF ESTABLISHMENT

Well over half of the responding employers reported work forces of not more than 25 persons. Chart II shows that in contrast, the total number of employees found in firms of this size is relatively small; the 2090 employees made up but one per cent of the total currently employed by respondents.

The most common size of work force among the respondents was the category containing from 1001 to 5000 employees. Forty-six per cent of the employees worked in the 31 firms of this size. The next most common

CHART I. Number of Responding Firms in Each of Three Jurisdictions in the Metropolitan Area; also, Number of Persons Currently Employed by Respondents in These Same Three Jurisdictions.

* Eight firms responded anonymously, furnishing no business address information.

ADDRESS

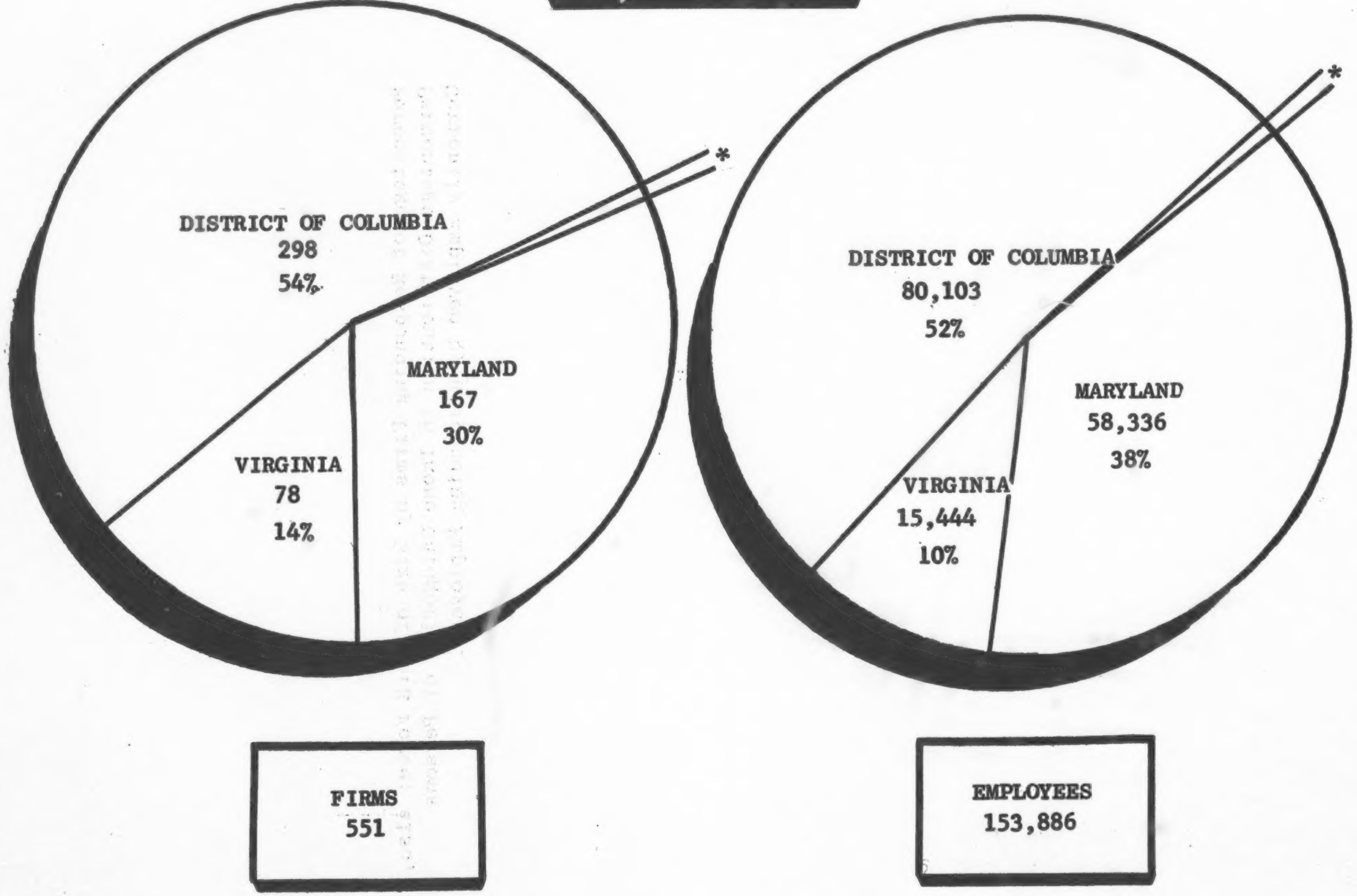
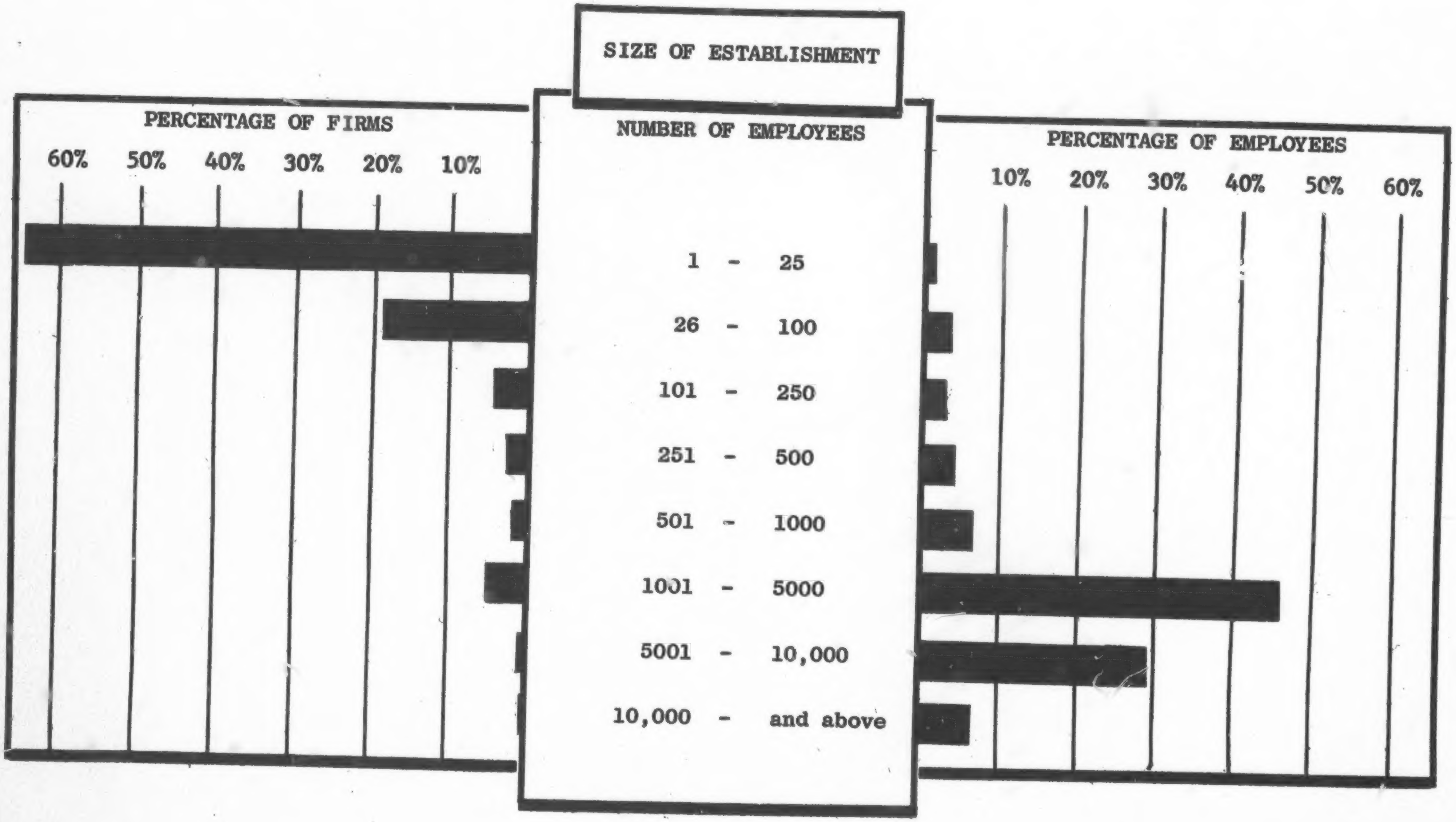

DISTRICT OF COLUMBIA
298
54%
MARYLAND
167
30%
VIRGINIA
78
14%
*
FIRMS
551
DISTRICT OF COLUMBIA
80,103
52%
MARYLAND
58,336
38%
VIRGINIA
15,444
10%
*
EMPLOYEES
153,886

CHART II. Percentage of Responding Firms by Size of Work Force; also, Percentage Distribution in These Categories of Persons Currently Employed by Responding Employers.


SIZE OF ESTABLISHMENT
PERCENTAGE OF FIRMS
60%
50%
40%
30%
20%
10%
NUMBER OF EMPLOYEES
1 - 25
26 - 100
101 - 250
251 - 500
501 - 1000
1001 - 5000
5001 - 10,000
10,000 - and above
PERCENTAGE OF EMPLOYEES
10%
20%
30%
40%
50%
60%

size of establishment was that employing from 5001 to 10,000 persons. In establishments of this size, six firms (only one per cent of the respondents) employed 44,699 or 29 per cent of the respondents' total number of employees.

TYPE OF BUSINESS

The business categories and sub-categories found in Charts III and IV were developed empirically to show the types of firms included in this Survey. Chart III is a summary illustration, while Chart IV presents the breakdown by types of establishments found within each of these major categories of business.

As might be expected considering the nature of the selected sample (Group II above), it is obvious from Chart III that the firms categorized as "Public and Quasi-Public Services" and "Research and Development" employed the largest numbers of persons. Together they accounted for 86 per cent or 131,770 of the 153,886 employees working in the firms of these 551 respondents. A detailed analysis of these two major types of business, by number of firms and number of currently employed, is included on the first page of Chart IV.

Wherever possible, the federal government figures were not lumped together, but instead were distributed according to sub-type of business. For example, the figures for the National Institutes of Health have been recorded under the "Health" sub-category of "Research and Development". "Residual" sub-categories for both federal and local government offices thus contain only those firms which could not properly be placed in any other category.

CHART III. Percentage of Responding Firms in Each of Eight Business Categories; also, Percentage Distribution in These Categories of Persons Currently Employed by Responding Employers.

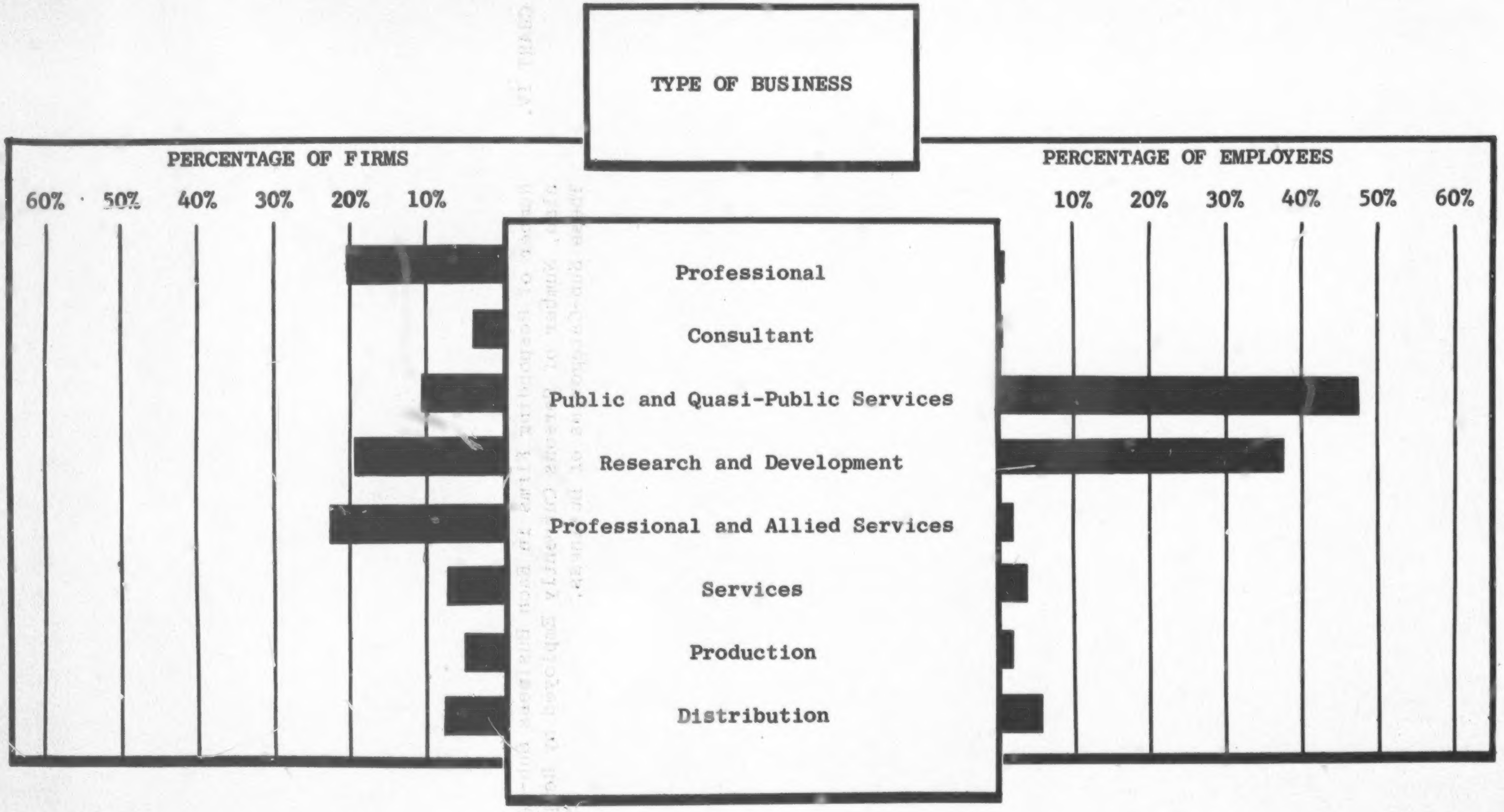

TYPE OF BUSINESS
PERCENTAGE OF FIRMS
PERCENTAGE OF EMPLOYEES
60%
50%
40%
30%
20%
10%
10%
20%
30%
40%
50%
60%
Professional
Consultant
Public and Quasi-Public Services
Research and Development
Professional and Allied Services
Services
Production
Distribution

CHART IV. Number of Responding Firms in Each Business Sub-Category; also, Number of Persons Currently Employed by Respondents in These Sub-Categories of Business.

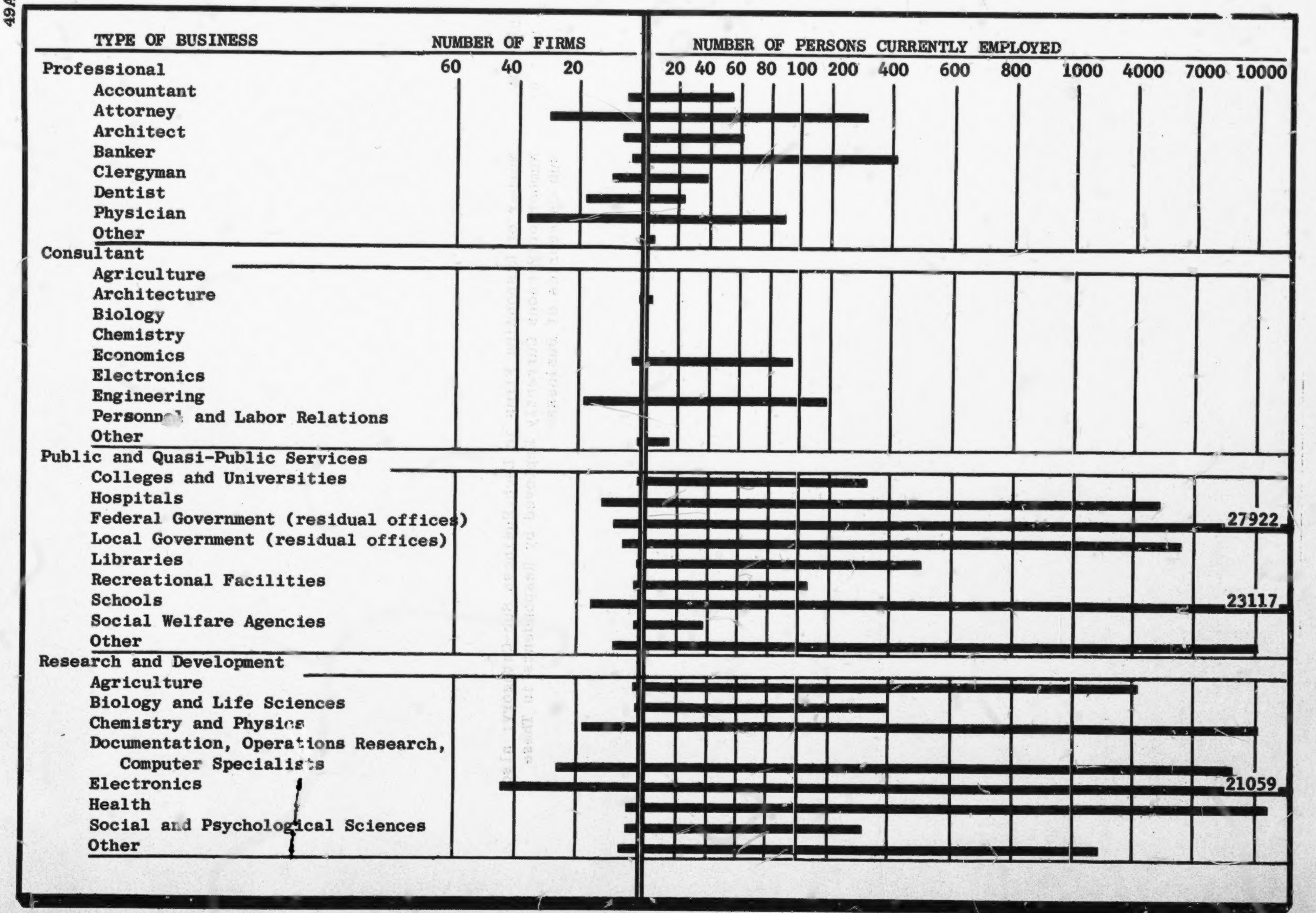
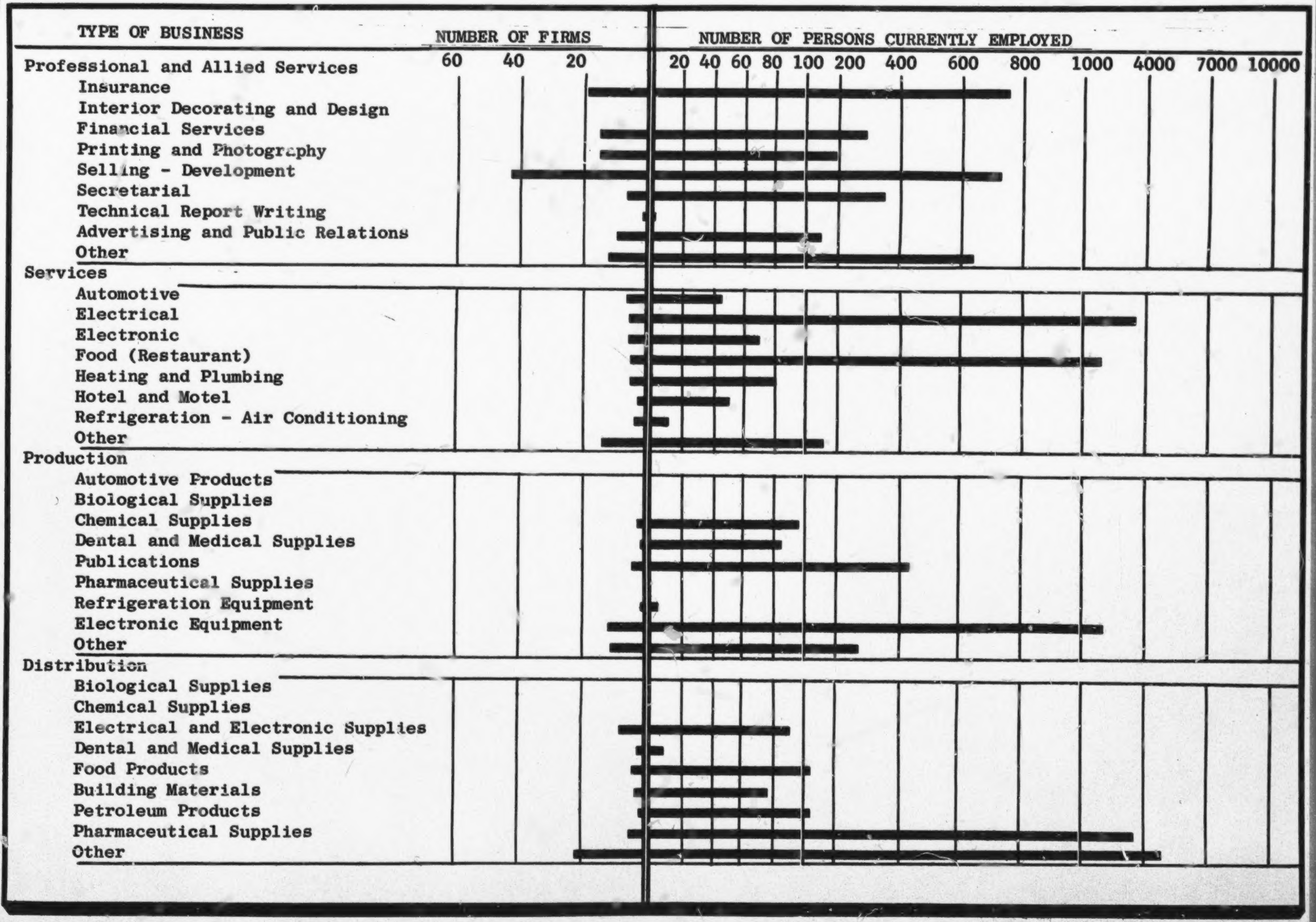

TYPE OF BUSINESS
NUMBER OF FIRMS
60
40
20
NUMBER OF PERSONS CURRENTLY EMPLOYED
20
40
60
80
100
200
400
600
800
1000
4000
7000
10000
Professional
Accountant
Attorney
Architect
Banker
Clergyman
Dentist
Physician
Other
Consultant
Agriculture
Architecture
Biology
Chemistry
Economics
Electronics
Engineering
Personnel and Labor Relations
Other
Public and Quasi-Public Services
Colleges and Universities
Hospitals
Federal Government (residual offices)
Local Government (residual offices)
Libraries
Recreational Facilities
Schools
Social Welfare Agencies
Other
Research and Development
Agriculture
Biology and Life Sciences
Chemistry and Physics
Documentation, Operations Research, Computer Specialists
Electronics
Health
Social and Psychological Sciences
Other
27922
23117
21059

CHART IV (cont'd) Number of Responding Firms in Each Business Sub-Category; also, Number of Persons Currently Employed by Respondents in These Sub-Categories of Business.


TYPE OF BUSINESS
NUMBER OF FIRMS
60
40
20
NUMBER OF PERSONS CURRENTLY EMPLOYED
20
40
60
80
100
200
400
600
800
1000
4000
7000
10000
Professional and Allied Services
Insurance
Interior Decorating and Design
Financial Services
Printing and Photography
Selling - Development
Secretarial
Technical Report Writing
Advertising and Public Relations
Other
Services
Automotive
Electrical
Electronic
Food (Restaurant)
Heating and Plumbing
Hotel and Motel
Refrigeration - Air Conditioning
Other
Production
Automotive Products
Biological Supplies
Chemical Supplies
Dental and Medical Supplies
Publications
Pharmaceutical Supplies
Refrigeration Equipment
Electronic Equipment
Other
Distribution
Biological Supplies
Chemical Supplies
Electrical and Electronic Supplies
Dental and Medical Supplies
Food Products
Building Materials
Petroleum Products
Pharmaceutical Supplies
Other

IS JUNIOR COLLEGE ENOUGH?

Based on the experience of their establishments, respondents were asked to list on the Information Chart inside the Questionnaire (see Appendix A) each Classification or curriculum which if offered as a two-year college program at Montgomery Junior College would fulfill a genuine educational need in the metropolitan Washington area. For each Classification so listed, they were then asked: "Would a person with two years of specialized college training satisfy your job requirements in this Classification?"

Chart V records the answers to this question given by their respective respondents about each of the Classifications. As a research convenience, these 54 Classifications (listed on page two of the Questionnaire) bear quadrant code numbers from 1 through 83, assigned in the following manner:

Quadrant Code Number	Type of Classification
1 through 25	Medical Auxiliary Technologies
26 through 50	Business
51 through 75	Applied Science Technologies
76 through 100	Public Service

Medical Auxiliary Technologies

For 8 of these 11 technologies, more than three-quarters of the respondents indicated that two years of specialized college training would satisfy their job requirements. The exceptions were Medical Technology, Medical Records Librarian, and Psychiatric Aide. Even in these instances more than 50 per cent of the respondents in each case felt that this two years of college education was sufficient.

A. Medical Auxiliary Technologies

1. Dental Assisting
2. Dental Hygiene
3. Medical Assisting
4. Medical Technology
5. Medical Secretarial
6. Medical Records Librarian
7. Nursing, 2 Year RN
8. Nursing, Licensed Practical
9. Psychiatric Aide
10. Physiotherapy
11. X-Ray Technology

B. Business

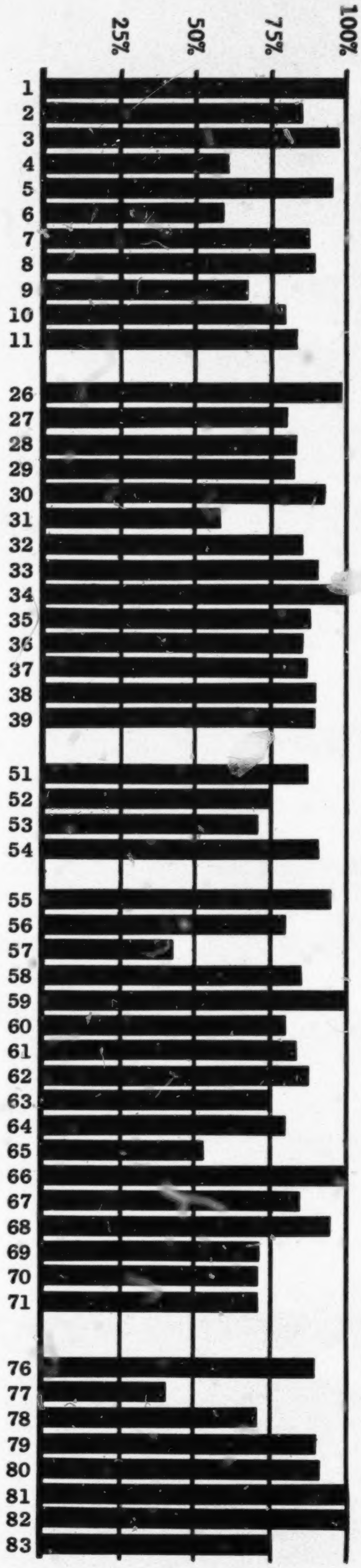
26. Secretarial (General, Legal, Technical)
27. Executive Administrative Aide
28. Personnel Management
29. Electronic Data Proc.-Business Applications
30. Small Business Administration
31. Banking
32. Insurance, Casualty and Surety
33. Real Estate
34. Interior Design and Decorating
35. Food Management
36. Hotel and Restaurant Management
37. Institutional Food Service Management
38. Art (Commercial and Technical)
39. Accounting

C. Applied Science Technologies

51. Air Conditioning and Refrig. Technology
52. Architectural Technology
53. Building Construction Technology
54. Civil Technology (Cartography, Photogrammetry, Highway Design Sub-groups)
55. Engineering Drafting and Design
56. Mechanical Technology
57. Tool Design
58. Instrumentation Technology
59. Quality and Cost Control
60. Electrical Technology
61. Electronic Technology
62. R & D Electronic Data Processing
63. Nuclear Technology
64. Radiation Technology
65. Space Technology
66. TV Broadcasting, Technical
67. Photography
68. Printing and Graphic Arts
69. Technical Report Writing
70. Chemical Technology
71. Pure Science Tech. (Biology, Chemistry, Physics)

D. Public Service

76. Law Enforcement (Police Training)
77. Public Administration
78. Social Welfare Assisting
79. Nursery School Education
80. Library Assisting
81. Teacher's Aide (Instruc. Material Asstg.)
82. Recreational Leadership
83. Occupational Therapy



Would a person with two years of specialized college training satisfy your job requirements in this Classification?

[✓ YES] NO

Business

Respondents answering this question about the Business curriculums were generally agreed that two years of specialized college training was enough to meet their requirements. The exception was Banking where only 54 per cent of the respondents answered the question in the affirmative.

Applied Science Technologies

Here again, most respondents felt that these technologies required no more than the two years of specialized college training. The two exceptions from this group of 21 Classifications may be noted for Tool Design and for Space Technology.

Public Service

Respondents in these fields indicated that two years of specialized college was sufficient for their job requirements with the exception of Public Administration, where only 40 per cent said that this amount of training would be enough.

The above evidence shows that with most of these Classifications, two years of specialized college training would satisfy the job requirements of employers. This is some indication that these curriculums are indeed appropriate for the two-year college.

CURRENT JOB DEMAND

For each Classification listed by employers, they were asked to indicate the "number of persons in this Classification currently employed by your concern", and as well the "number of vacancies in this Classification you are currently trying to fill". Together these figures constitute the total "current job demand" for each of the 54 Classifications. The three pages of Chart VI show in detail this occupational pattern as reported by the 551 respondents, who together employed a total of 153,886 persons.

Medical Auxiliary Technologies

Chart VI shows that the two Medical Auxiliary Technologies with the largest current job demand were Nursing--2 Year RN, and Nursing--Licensed Practical. Respondents reported a current demand of approximately 500 for Nursing, and 650 for Practical Nursing, including about 75 vacancies in the former and 150 vacancies in the latter. In third and fourth rank according to current demand were Medical Secretarial and Medical Technology, two curriculums already offered by Montgomery Junior College.

Business

Figures on the second page of Chart VI leave no doubt that Washington firms employ a lot of secretaries and would like to employ more. The current job demand for the Secretarial Classification was over 7000, including almost 350 current vacancies reported by Survey respondents. Other curriculums with substantial current job demand included Accounting with about 800, Food Management with 750, Electronic Data Processing--Business Applications and Executive Administrative Aide with about 475 each, and Real Estate and Personnel Management with a current job demand of about 300 employees each.

Applied Science Technologies

Current job demand reported by respondents for the Applied Science Technologies may be found on the third page of Chart VI. A figure of well over 2000 persons was indicated for Electronic Technology, including more than

CHART VI. **Current Job Demand for Each Classification: Aggregate Number of Persons Currently Employed by Respondents, plus Aggregate Number of Current Vacancies.***

---

* **On Chart VI (and on certain other Charts which follow) the Medical Auxiliary Technologies and the Public Service types of Classifications have been combined on one Chart, purely as a matter of spacing convenience. Both the Business and the Applied Science Technologies contain more Classifications, and so each has been recorded on a separate page of the Chart.**

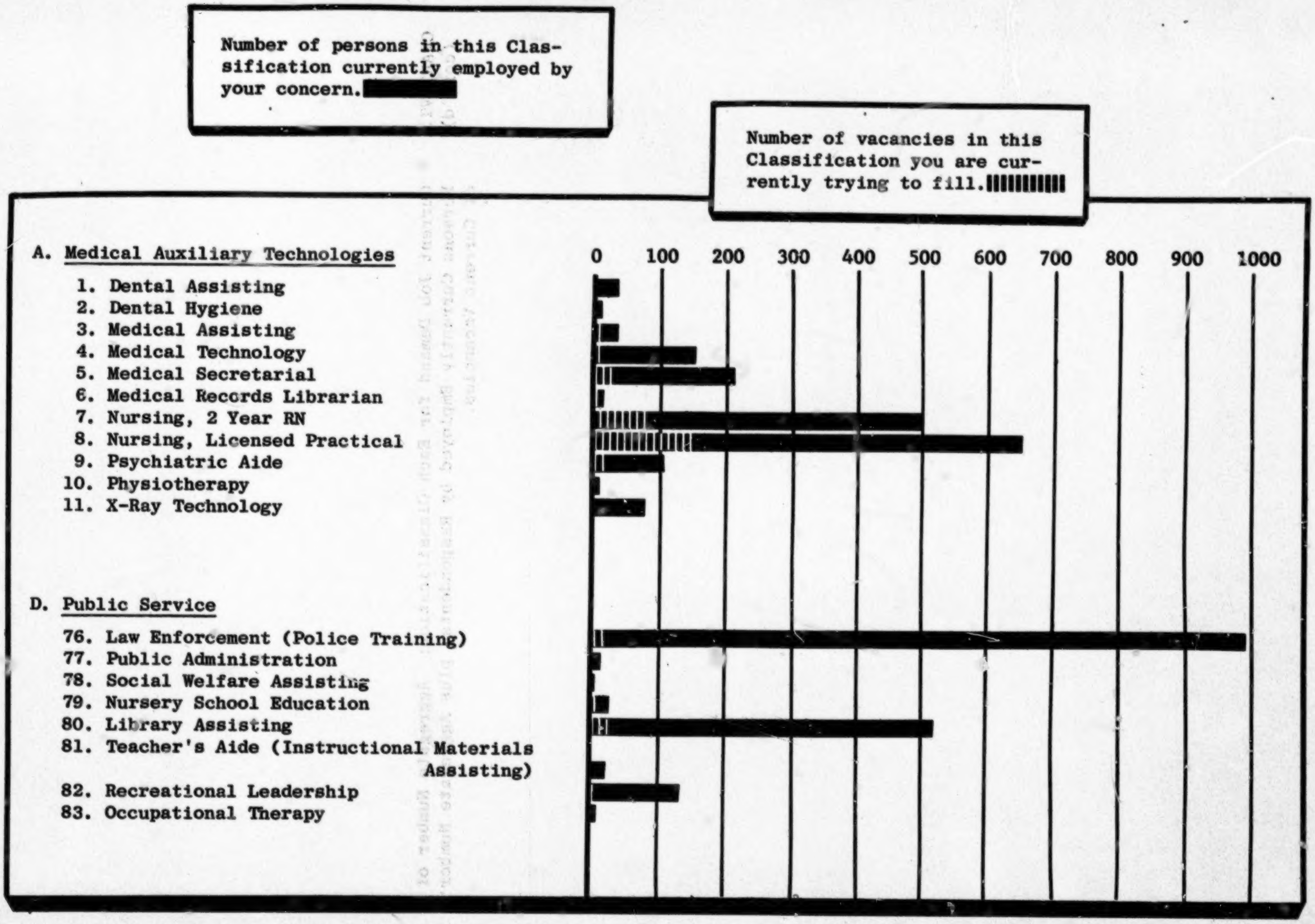

Number of persons in this Classification currently employed by your concern. ■
Number of vacancies in this Classification you are currently trying to fill. ▥
0
100
200
300
400
500
600
700
800
900
1000
A. Medical Auxiliary Technologies
1. Dental Assisting
2. Dental Hygiene
3. Medical Assisting
4. Medical Technology
5. Medical Secretarial
6. Medical Records Librarian
7. Nursing, 2 Year RN
8. Nursing, Licensed Practical
9. Psychiatric Aide
10. Physiotherapy
11. X-Ray Technology
D. Public Service
76. Law Enforcement (Police Training)
77. Public Administration
78. Social Welfare Assisting
79. Nursery School Education
80. Library Assisting
81. Teacher's Aide (Instructional Materials Assisting)
82. Recreational Leadership
83. Occupational Therapy

CHART VI. **Current Job Demand for Each Classification: Aggregate Number of**
(cont'd) **Persons Currently Employed by Respondents, plus Aggregate Number of Current Vacancies.**

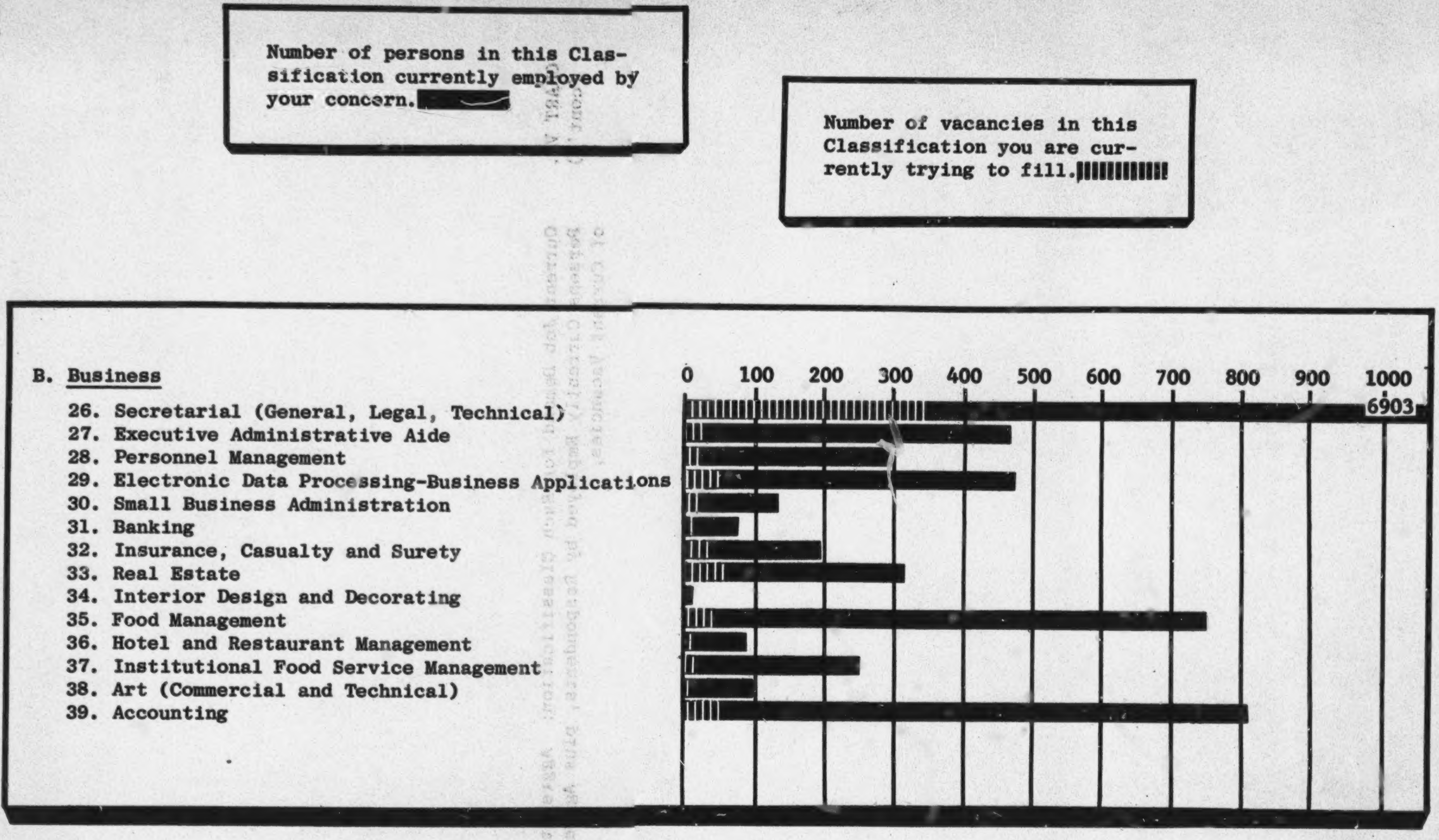
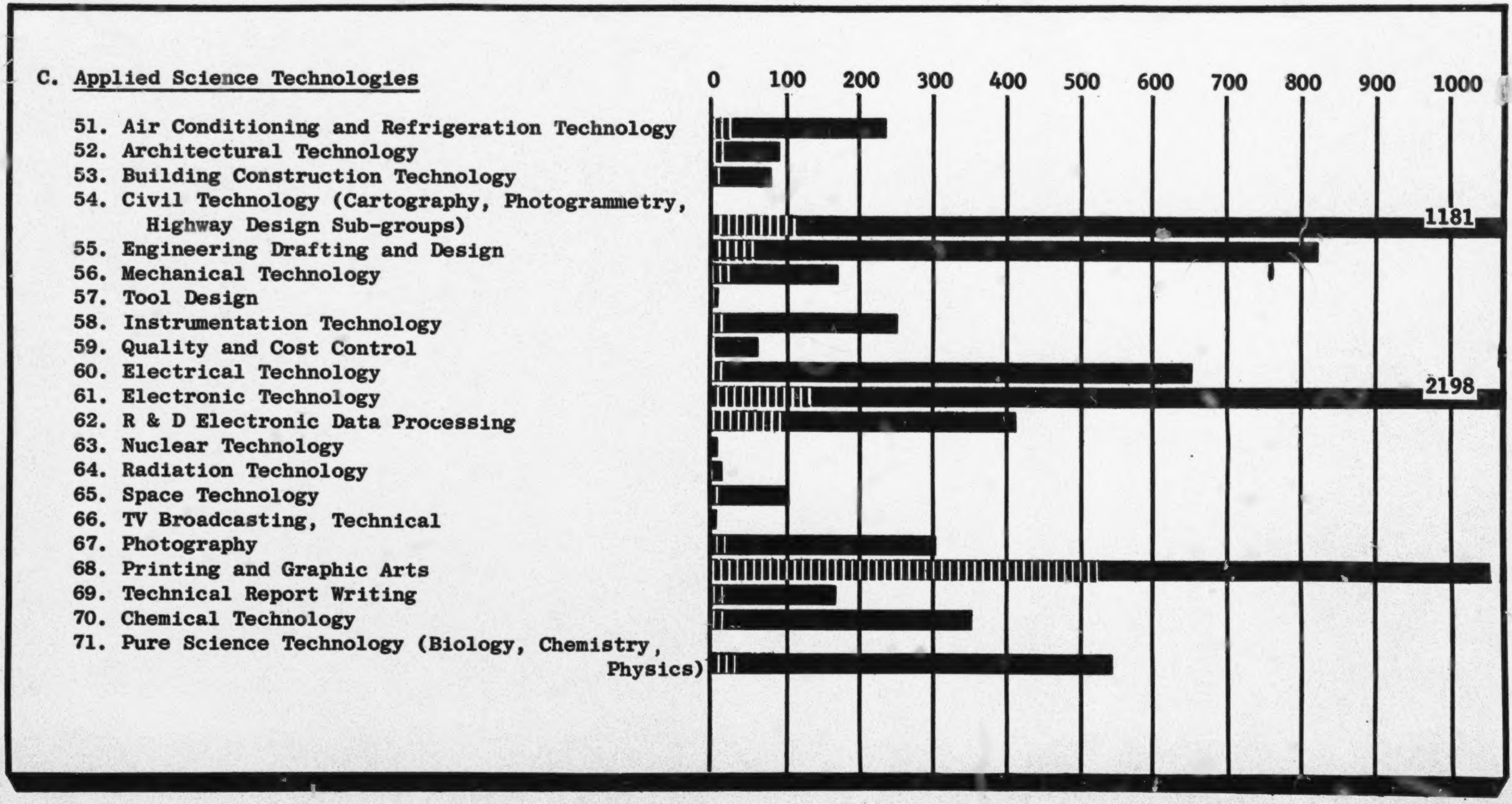

Number of persons in this Classification currently employed by your concern. ■
Number of vacancies in this Classification you are currently trying to fill. ▥
B. Business
26. Secretarial (General, Legal, Technical)
27. Executive Administrative Aide
28. Personnel Management
29. Electronic Data Processing-Business Applications
30. Small Business Administration
31. Banking
32. Insurance, Casualty and Surety
33. Real Estate
34. Interior Design and Decorating
35. Food Management
36. Hotel and Restaurant Management
37. Institutional Food Service Management
38. Art (Commercial and Technical)
39. Accounting
0
100
200
300
400
500
600
700
800
900
1000
6903

CHART VI. Current Job Demand for Each Classification: Aggregate Number of Persons Currently Employed by Respondents, plus Aggregate Number of Current Vacancies.
(cont'd)

Number of persons in this Classification currently employed by your concern. ■

Number of vacancies in this Classification you are currently trying to fill. ▥



100 current vacancies. The current job demand for Printing and Graphic Arts stood at some 1500, including a third of this number (500) in current vacancies. According to these 551 respondents, Civil Technology was third from the top with a total of 1300 persons indicated. Engineering Drafting and Design showed 800, Electrical Technology stood at 650, Pure Science Technology--Biology, Chemistry, Physics near 550, Research and Development Electronic Data Processing at 400, with Chemical Technology at 350 and Photography at 300. Vacancies numbering approximately 100 each for the Classifications of Civil Technology, Electronic Technology, and Research and Development Electronic Data Processing were reported in the firms of these respondents.

Public Service

Respondents listing the Classification Law Enforcement--Police Training (mostly local governments) indicated a current job demand of about 1000 persons. Library Assisting showed the second largest current job demand with just over 500.

Current job demand indicated by these 551 respondents for each of the four types of Classifications may be found in Table IV. (Figures for the Secretarial Classification have been shown as sub-totals in Table IV in order to indicate their preponderance in the totals given for the Business types of Classifications).

Together these 551 firms currently employed 22,059 persons in these 54 specific Classifications, reported 2,116 vacancies, and thus had a current job demand of 24,175 persons. When the latter total is taken as a percentage of the grand total currently employed in all 551 establishments,

TABLE IV

Type of Classification	Currently Employed		Vacancies		Total Current Job Demand	
MEDICAL AUXILIARY TECHNOLOGIES		1,501		284		1,785
BUSINESS		10,553		669		11,222
Secretarial	6,903		341		7,244	
Other Business Classifications	3,650		328		3,978	
APPLIED SCIENCE TECHNOLOGIES		8,339		1,111		9,450
PUBLIC SERVICE		1,666		52		1,718
		22,059		2,116		24,175

Total number of persons currently employed in the 551 responding establishments............ 153,886

Percentage of total currently employed who are now working in the four types of Technical and Semi-Professional Classifications.... 15.7%.

it may be seen that this group of 24,175 technical and semi-professional employees constituted 15.7 per cent of this total work force. Stated another way, about one in every six jobs in these responding firms was of this intermediate or assisting type.

FIVE YEAR ESTIMATE OF OCCUPATIONAL NEEDS

For each Classification listed, employers were asked to estimate the "total number of job openings to be filled by your firm in this Classification during the next five years". This one question was designed to elicit answers about both turnover and additional positions to be created in the next five years.

Not surprisingly, the three Medical Auxiliary Technologies with the greatest current job demand (currently employed plus vacancies) also show in Chart VII the largest five-year estimates of anticipated job openings. These respondents expected to employ over 600 Practical Nurses, almost 500 Nurses, and over 400 Medical Secretaries.

Business

The needs of respondents for Secretaries again put this Classification in top position with respect to employment estimates for the next 5 years. Accounting stood next, with an estimated demand for 700 employees in this future period. Electronic Data Processing--Business Applications showed a need for 500 employees, Food Management for 450, and Institutional Food Service Management and Executive Administrative Aide for 250 each, over the next five years.

Applied Science Technologies

The most pressing future needs in the Applied Science area were indicated for Printing and Graphic Arts, Electronic Technology, and Engineering Drafting and Design, with respective estimates of about 3000, 2500, and 1000 job openings by the responding firms. Civil Technology and Research and Development Electronic Data Processing showed a five-year demand for about 900 and 875 employees, respectively. Pure Science Technology followed with 350, Chemical Technology with 250, Technical Report Writing and Mechanical Technology with approximately 225, and Instrumentation Technology, Electrical Technology, and Photography with almost 200 employees each.

Public Service

Five-year estimates for the Public Service Classifications are largest for Recreational Leadership, Law Enforcement--Police Training, and

CHART VII. For Each Classification, Aggregate Estimated Job Openings to be Filled by Respondents During the Next Five Years; also, Number of Respondents Giving These Estimates for Each Classification.

Estimated total number of job openings to be filled by your firm in this Classification during the next 5 years.

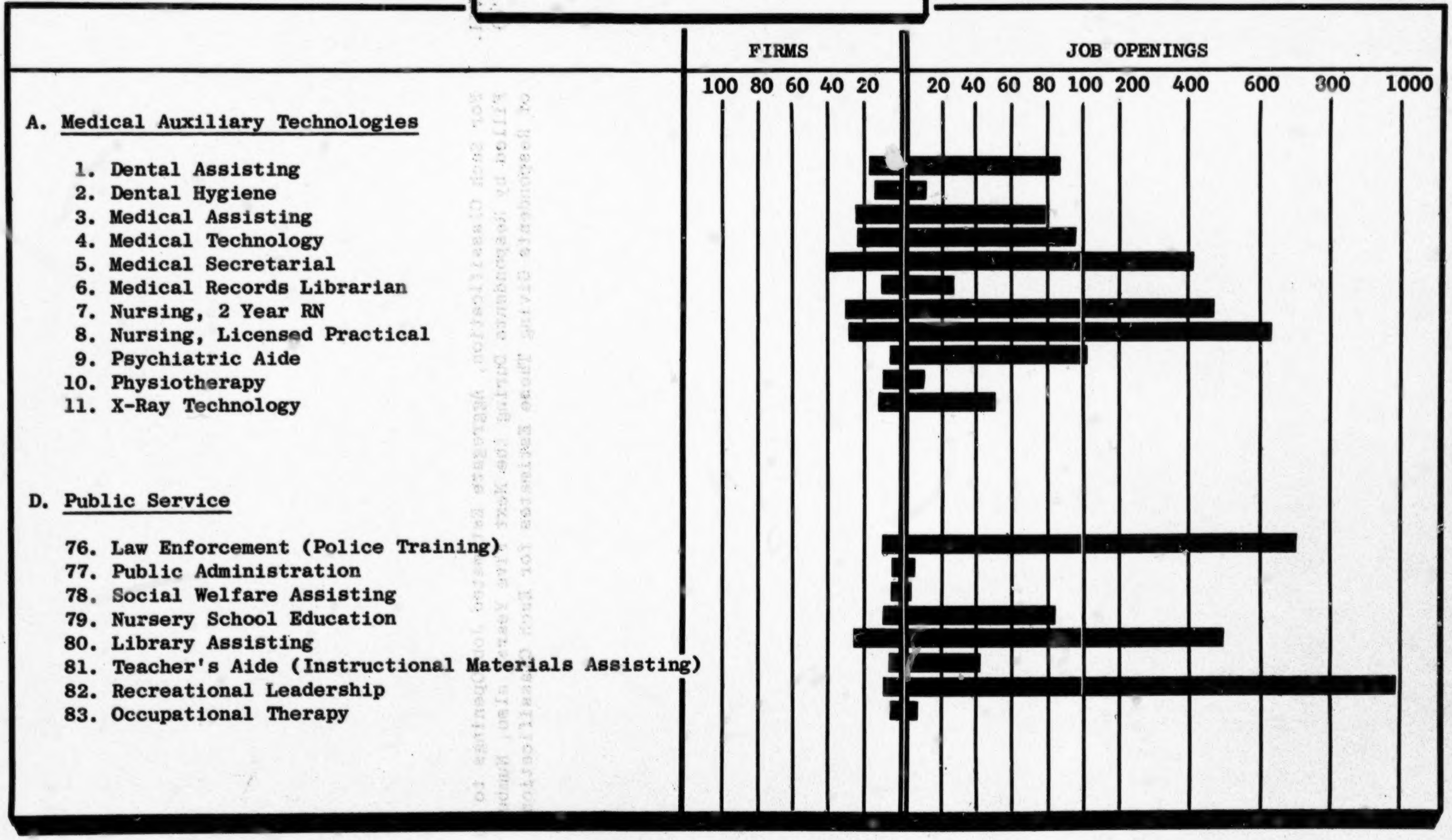


CHART VII. (cont'd) **For Each Classification, Aggregate Estimated Job Openings to be Filled by Respondents During the Next Five Years; also, Number of Respondents Giving These Estimates for Each Classification.**

Estimated total number of job openings to be filled by your firm in this Classification during the next 5 years.

B. **Business**

26. Secretarial (General, Legal, Technical)
27. Executive Administrative Aide
28. Personnel Management
29. Electronic Data Processing-Business Applications
30. Small Business Administration
31. Banking
32. Insurance, Casualty and Surety
33. Real Estate
34. Interior Design and Decorating
35. Food Management
36. Hotel and Restaurant Management
37. Institutional Food Service Management
38. Art (Commercial and Technical)
39. Accounting

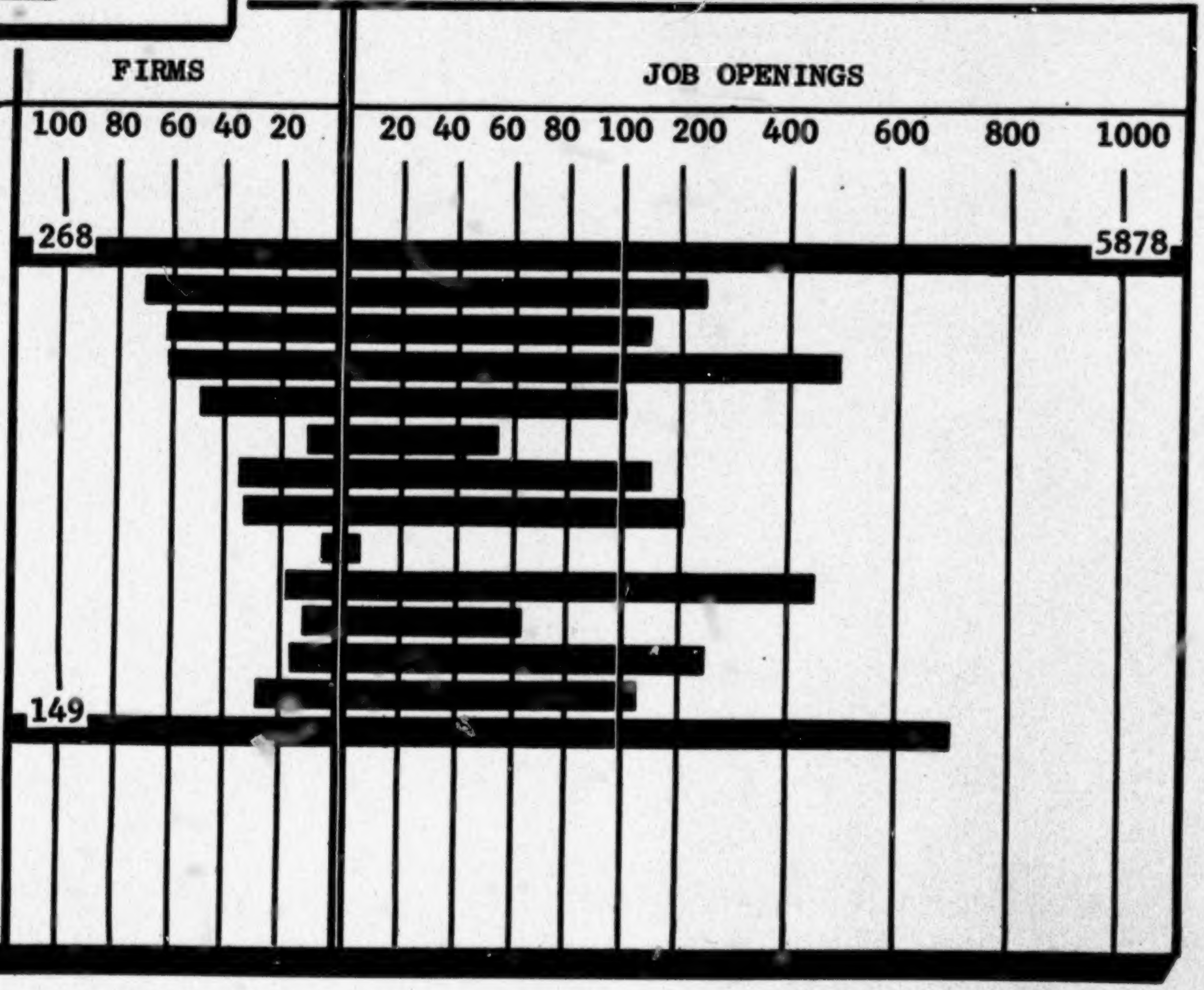
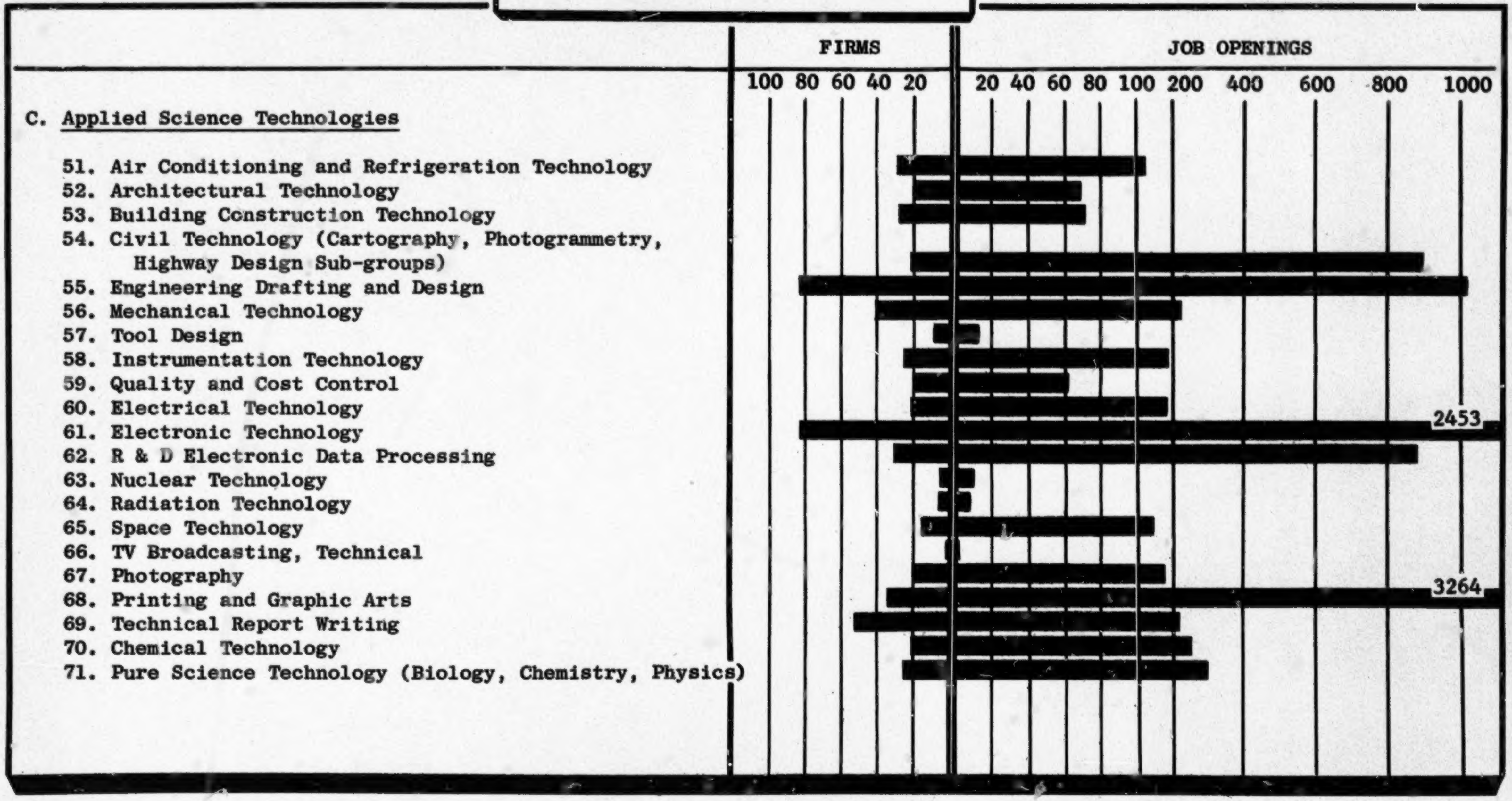


CHART VII. (cont'd)

For Each Classification, Aggregate Estimated Job Openings to be Filled by Respondents During the Next Five Years; also, Number of Respondents Giving These Estimates for Each Classification.

Estimated total number of job openings to be filled by your firm in this Classification during the next 5 years.



Library Assisting, with about 1000, 700, and 500 job openings respectively predicted for these three Classifications by responding firms.

Comparative five-year estimates for each of the four types of Classifications may be seen in Table V. Again the Secretarial sub-total is shown to indicate its relative weight in the Business total.

TABLE V

Type of Classification	Total Number of Job Openings Estimated by Respondents For the Next Five Years	
MEDICAL AUXILIARY TECHNOLOGIES		1,994
BUSINESS		8,867
Secretarial	5,878	
Other Business Classifications	2,989	
APPLIED SCIENCE TECHNOLOGIES		10,657
PUBLIC SERVICE		2,336
		23,854

Together these 551 firms predicted 23,854 job openings in these specific Classifications during the next five years (or an average of almost 5000 each year), including both turnover and new positions. It is interesting to note that this estimate of job openings for the next five years is very close to the 24,175 employees shown in Table IV as the total current job demand for these Classifications.

In the firms of these 551 employers, the anticipated five-year demand was greatest for the combined Applied Science Technologies, with Business Classifications in second place.

HARD TO FILL?

Respondents were asked to answer this question with regard to each Classification which they listed on the Information Chart of the Questionnaire: "Is this a 'hard to fill' job?" They were to check "Yes" if "vacancies usually take over 30 days to fill, or if the majority must be recruited from outside the metropolitan Washington area".

Chart VIII shows the percentage of respondents who answered this question in the affirmative for each Classification.

Medical Auxiliary Technologies

All the employers who listed Medical Records Librarian or Physiotherapy considered these to be "hard to fill" jobs. Almost 90 per cent of the respondents replying with respect to Medical Technology or Nursing--2 Year RN also categorized these positions as "hard to fill".

Business

Four of the fourteen Business Classifications were regarded as "hard to fill": Real Estate, Insurance--Casualty and Surety, Interior Design and Decorating, and Hotel and Restaurant Management. At least 75 per cent of the respective employers indicated that they found these Classifications "hard to fill".

Applied Science Technologies

Nuclear Technology, Radiation Technology, and TV Broadcasting--Technical were all considered "hard to fill" by all employers responding to this question about them. As may be seen in Chart VIII, three-quarters or more of the responding employers also found these Classifications difficult to fill: Air Conditioning Technology, Architectural Technology, Building Technology, Tool Design, and Research and Development Electronic Data

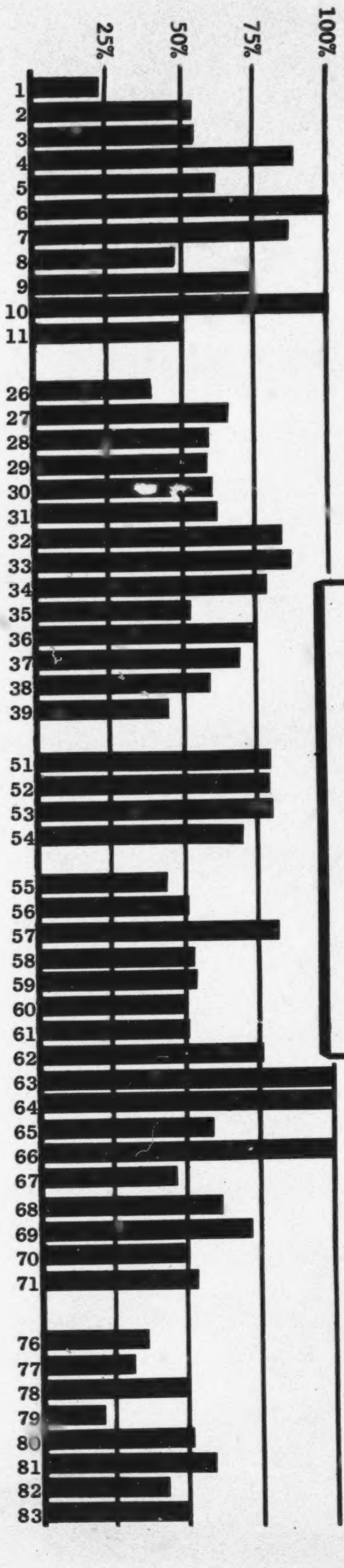
CHART VIII. For Each Classification, Percentage of Respondents Answering YES to This Question: "Is this a 'hard to fill' job?"

A. Medical Auxiliary Technologies
1. Dental Assisting
2. Dental Hygiene
3. Medical Assisting
4. Medical Technology
5. Medical Secretarial
6. Medical Records Librarian
7. Nursing, 2 Year RN
8. Nursing, Licensed Practical
9. Psychiatric Aide
10. Physiotherapy
11. X-Ray Technology

B. Business
26. Secretarial (General, Legal, Technical)
27. Executive Administrative Aide
28. Personnel Management
29. Electronic Data Proc.-Business Applications
30. Small Business Administration
31. Banking
32. Insurance, Casualty and Surety
33. Real Estate
34. Interior Design and Decorating
35. Food Management
36. Hotel and Restaurant Management
37. Institutional Food Service Management
38. Art (Commercial and Technical)
39. Accounting

C. Applied Science Technologies
51. Air Conditioning and Refrig. Technology
52. Architectural Technology
53. Building Construction Technology
54. Civil Technology (Cartography, Photogrammetry, Highway Design Sub-groups)
55. Engineering Drafting and Design
56. Mechanical Technology
57. Tool Design
58. Instrumentation Technology
59. Quality and Cost Control
60. Electrical Technology
61. Electronic Technology
62. R & D Electronic Data Processing
63. Nuclear Technology
64. Radiation Technology
65. Space Technology
66. TV Broadcasting, Technical
67. Photography
68. Printing and Graphic Arts
69. Technical Report Writing
70. Chemical Technology
71. Pure Science Tech. (Biology, Chemistry, Physics)

D. Public Service
76. Law Enforcement (Police Training)
77. Public Administration
78. Social Welfare Assisting
79. Nursery School Education
80. Library Assisting
81. Teacher's Aide (Instruc. Material Asstg.)
82. Recreational Leadership
83. Occupational Therapy



Is this a "hard to fill" job?

(Check YES if vacancies usually take over 30 days to fill, or if the majority must be recruited from outside the metropolitan Washington area.)

Processing. One of the large electronics firms added this comment: "We have currently a critical shortage in data processing people--programmers, computer operators, tab equipment operators, key punch operators." Both Civil Technology and Technical Report Writing fell just below the arbitrary point of 75 per cent taken as indicative of "hard to fill" for a given Classification.

Public Service

The respondents answering this question about Public Service Classifications apparently found none of them very difficult to fill. In no Classification did more than 60 per cent of these specific employers answer this question in the affirmative.

In summary of the data presented in Chart VIII it may be stated that the Applied Science and the Medical Auxiliary Technologies were more often considered "hard to fill" than were the other two types of Classifications.

ORGANIZED TRAINING PROGRAMS

As may be seen by Chart IX, organized training programs for most of the 54 Classifications were the exception rather than the rule. This fact has curricular implications for the community college; if few employers provide such programs, graduates must be ready to function in entry positions rather than depending upon further in-plant training.

Medical Auxiliary Technologies

Except for X-Ray Technology, not more than one-quarter of any of these eleven sets of employers reported organized training programs for their respective Classifications.

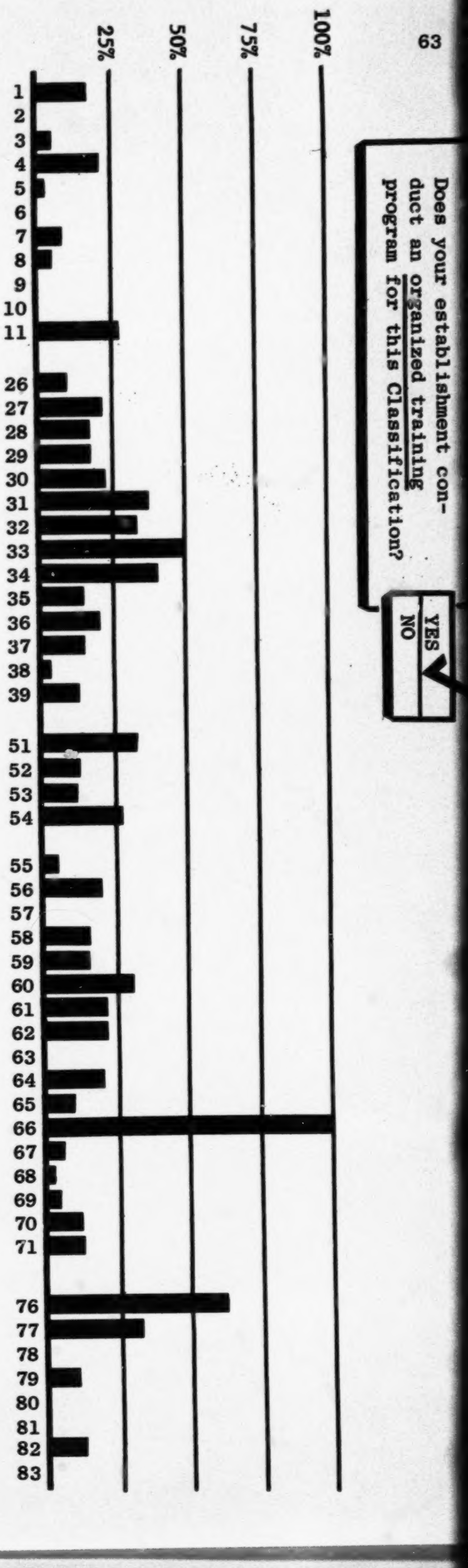
CHART IX. For Each Classification, Percentage of Respondents Answering YES to This Question: "Does your establishment conduct an organized training program for this Classification?"

A. Medical Auxiliary Technologies
1. Dental Assisting
2. Dental Hygiene
3. Medical Assisting
4. Medical Technology
5. Medical Secretarial
6. Medical Records Librarian
7. Nursing, 2 Year RN
8. Nursing, Licensed Practical
9. Psychiatric Aide
10. Physiotherapy
11. X-Ray Technology

B. Business
26. Secretarial (General, Legal, Technical)
27. Executive Administrative Aide
28. Personnel Management
29. Electronic Data Proc.-Business Applications
30. Small Business Administration
31. Banking
32. Insurance, Casualty and Surety
33. Real Estate
34. Interior Design and Decorating
35. Food Management
36. Hotel and Restaurant Management
37. Institutional Food Service Management
38. Art (Commercial and Technical)
39. Accounting

C. Applied Science Technologies
51. Air Conditioning and Refrig. Technology
52. Architectural Technology
53. Building Construction Technology
54. Civil Technology (Cartography, Photogrammetry, Highway Design Sub-groups)
55. Engineering Drafting and Design
56. Mechanical Technology
57. Tool Design
58. Instrumentation Technology
59. Quality and Cost Control
60. Electrical Technology
61. Electronic Technology
62. R & D Electronic Data Processing
63. Nuclear Technology
64. Radiation Technology
65. Space Technology
66. TV Broadcasting, Technical
67. Photography
68. Printing and Graphic Arts
69. Technical Report Writing
70. Chemical Technology
71. Pure Science Tech. (Biology, Chemistry, Physics)

D. Public Service
76. Law Enforcement (Police Training)
77. Public Administration
78. Social Welfare Assisting
79. Nursery School Education
80. Library Assisting
81. Teacher's Aide (Instruc. Material Asstg.)
82. Recreational Leadership
83. Occupational Therapy



Business

Chart IX shows that between one-third and one-half of the respondents answering this question about Banking, Insurance--Casualty and Surety, Real Estate, and Interior Design and Decorating reported organized training programs in their establishments for these Classifications.

Applied Science Technologies

An organized training program was listed by the one participating firm reporting employees in the Classification of TV Broadcasting--Technical. Also, almost one-third of the Air Conditioning and Refrigeration Technology, Civil Technology, and Electrical Technology employers reported organized training.

Public Service

Over 60 per cent of the employers of police noted an organized training program. This may be seen on Chart IX as Law Enforcement--Police Training. About one-third of the respondents answering this inquiry about Public Administration reported in the affirmative.

UP-GRADING*

Employers were asked to answer two questions about recruitment policy for each of the Classifications they listed on the Information Chart inside the Questionnaire. Chart X is a graphic illustration of the answers to the first of these questions: "What percentage of persons in this Classification do you currently recruit by up-grading present employees through on-the-job training or in-plant education?"

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*Question 7 on page 3 of the Questionnaire deals with recruitment policy. It was constructed to indicate to respondents that recruitment percentages given by them for all sources--both up-grading of present employees and direct recruitment from types of educational institutions--were to total 100 per cent. In fact, the 100 per cent was even printed on the Survey form as an added precaution. In spite of all this care, however, some employers recorded a given percentage for recruitment by up-grading (Question 7a), and in addition recorded percentages totaling 100 per cent for direct recruitment from the various types of educational institutions (Question 7b).

For a given Classification, therefore, the number indicated as recruited by the combination of answers from Question 7a and Question 7b may total more than the number currently employed in that Classification by the 551 respondents. Under the circumstances, the figures presented in Chart XI may be more closely related to actual educational background of employees in the respective Classifications than to direct recruitment from these specific types of educational institutions.

Medical Auxiliary Technologies

As may be seen in Chart X, any appreciable amount of recruitment by up-grading is reported for only two of these Classifications: Medical Technology and Medical Secretarial. Employers in these fields reported that they recruited by up-grading present employees a number equal to about one-third of the persons currently employed in these respective Classifications.

Business

Recruitment by up-grading present employees was more common in the Business Classifications. Survey respondents in the Classifications of Executive Administrative Aide and Institutional Food Service Management reported this type of recruitment source for a number equal to about two-thirds of those currently employed.

More than one-quarter of the number given for current employees were recruited by up-grading in each of the following Classifications: Secretarial, Personnel Management, Electronic Data Processing--Business Applications, Insurance--Casualty and Surety, Food Management, Hotel and Restaurant Management, and Accounting.

Applied Science Technologies

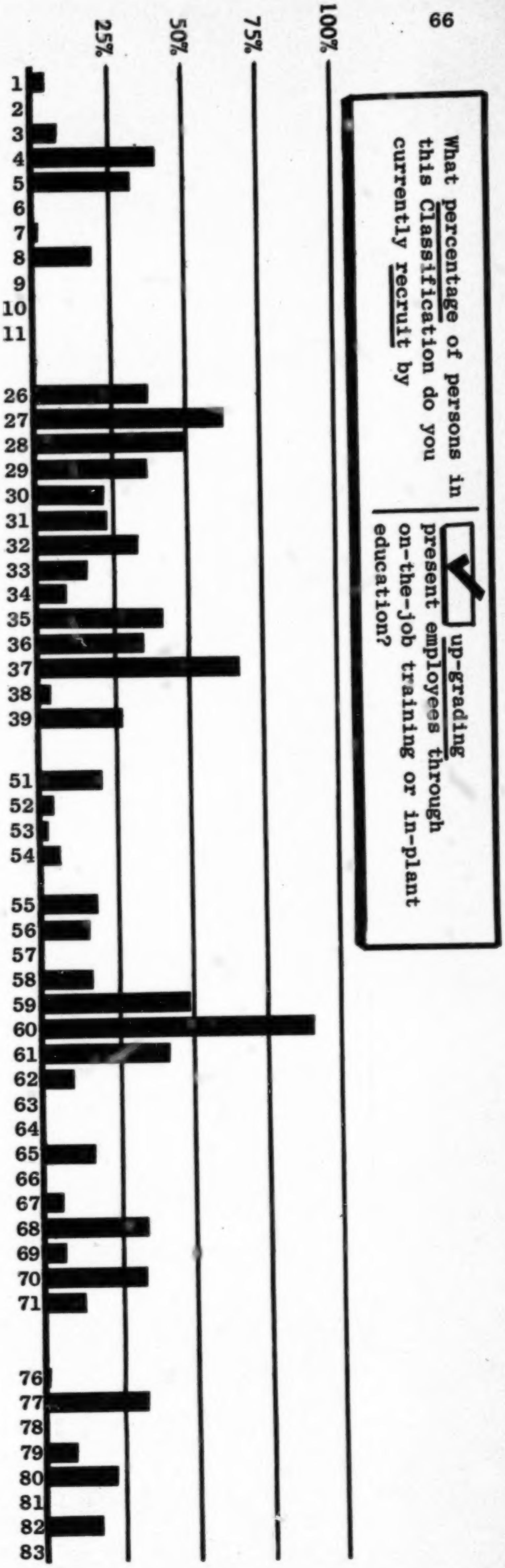
The largest percentage of persons recruited by up-grading occurred in Electrical Technology; there the number was equal to 89 per cent of those currently employed by the respondents. Up-grading recruitment figures equal to one-third or more of those currently employed in Quality and Cost Control,

A. Medical Auxiliary Technologies
1. Dental Assisting
2. Dental Hygiene
3. Medical Assisting
4. Medical Technology
5. Medical Secretarial
6. Medical Records Librarian
7. Nursing, 2 Year RN
8. Nursing, Licensed Practical
9. Psychiatric Aide
10. Physiotherapy
11. X-Ray Technology

B. Business
26. Secretarial (General, Legal, Technical)
27. Executive Administrative Aide
28. Personnel Management
29. Electronic Data Proc.-Business Applications
30. Small Business Administration
31. Banking
32. Insurance, Casualty and Surety
33. Real Estate
34. Interior Design and Decorating
35. Food Management
36. Hotel and Restaurant Management
37. Institutional Food Service Management
38. Art (Commercial and Technical)
39. Accounting

C. Applied Science Technologies
51. Air Conditioning and Refrig. Technology
52. Architectural Technology
53. Building Construction Technology
54. Civil Technology (Cartography, Photogrammetry, Highway Design Sub-groups)
55. Engineering Drafting and Design
56. Mechanical Technology
57. Tool Design
58. Instrumentation Technology
59. Quality and Cost Control
60. Electrical Technology
61. Electronic Technology
62. R & D Electronic Data Processing
63. Nuclear Technology
64. Radiation Technology
65. Space Technology
66. TV Broadcasting, Technical
67. Photography
68. Printing and Graphic Arts
69. Technical Report Writing
70. Chemical Technology
71. Pure Science Tech. (Biology, Chemistry, Physics)

D. Public Service
76. Law Enforcement (Police Training)
77. Public Administration
78. Social Welfare Assisting
79. Nursery School Education
80. Library Assisting
81. Teacher's Aide (Instruc. Material Asstg.)
82. Recreational Leadership
83. Occupational Therapy



What percentage of persons in this Classification do you currently recruit by ☑ up-grading present employees through on-the-job training or in-plant education?

Electronic Technology, Printing and Graphic Arts, and Chemical Technology were also reported.

Public Service

For only one Classification, Public Administration, was any appreciable amount of recruitment by up-grading indicated. Here the number was equal to about one-third of those currently employed by respondents in this field.

RECRUITMENT FROM TYPES OF EDUCATIONAL INSTITUTIONS

Employers responding to this Survey were also asked to indicate for each Classification listed, the percentages recruited directly by them from specified types of educational institutions. Chart XI summarizes these data obtained from the responding firms. The percentage bars drawn for each of the 54 Classifications on this graph are composed of four separate percentages, indicating from bottom to top of each bar the percentages recruited from high school, junior college, university or college, and a residual category labeled "other".

Medical Auxiliary Technologies

Figures given in this portion of Chart XI indicate that few of the people filling these positions were in fact recruited directly from any of these listed types of educational institutions. The largest single percentage occurred for Psychiatric Aide: about 30 per cent of the number reported as currently employed in this Classification were recruited directly from the high schools. Employers responding to this question for Dental Hygiene, Medical Technology, and Medical Records Librarian indicated that a number equal to about 1 in 5 of their currently employed in this Classification

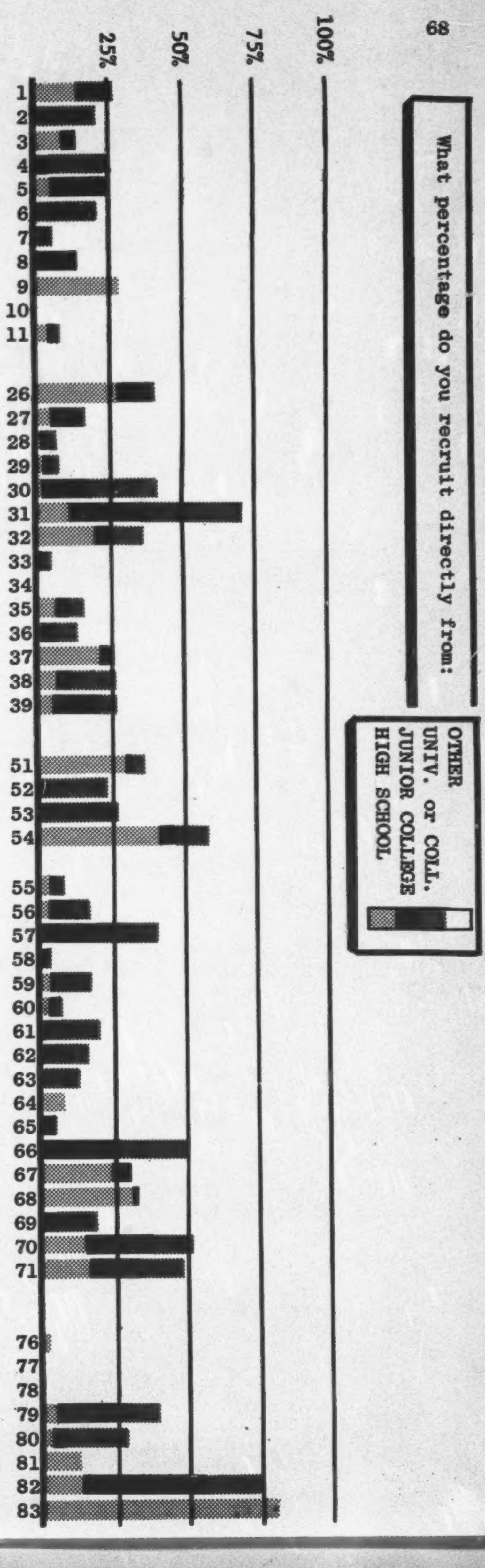
CHART XI. **For Each Classification, Percentage of Aggregate Number of Persons Currently Employed by Respondents Who Were Reported Recruited Directly from Indicated Types of Educational Institutions.**

A. Medical Auxiliary Technologies
1. Dental Assisting
2. Dental Hygiene
3. Medical Assisting
4. Medical Technology
5. Medical Secretarial
6. Medical Records Librarian
7. Nursing, 2 Year RN
8. Nursing, Licensed Practical
9. Psychiatric Aide
10. Physiotherapy
11. X-Ray Technology

B. Business
26. Secretarial (General, Legal, Technical)
27. Executive Administrative Aide
28. Personnel Management
29. Electronic Data Proc.-Business Applications
30. Small Business Administration
31. Banking
32. Insurance, Casualty and Surety
33. Real Estate
34. Interior Design and Decorating
35. Food Management
36. Hotel and Restaurant Management
37. Institutional Food Service Management
38. Art (Commercial and Technical)
39. Accounting

C. Applied Science Technologies
51. Air Conditioning and Refrig. Technology
52. Architectural Technology
53. Building Construction Technology
54. Civil Technology (Cartography, Photogrammetry, Highway Design Sub-groups)
55. Engineering Drafting and Design
56. Mechanical Technology
57. Tool Design
58. Instrumentation Technology
59. Quality and Cost Control
60. Electrical Technology
61. Electronic Technology
62. R & D Electronic Data Processing
63. Nuclear Technology
64. Radiation Technology
65. Space Technology
66. TV Broadcasting, Technical
67. Photography
68. Printing and Graphic Arts
69. Technical Report Writing
70. Chemical Technology
71. Pure Science Tech. (Biology, Chemistry, Physics)

D. Public Service
76. Law Enforcement (Police Training)
77. Public Administration
78. Social Welfare Assisting
79. Nursery School Education
80. Library Assisting
81. Teacher's Aide (Instruc. Material Asstg.)
82. Recreational Leadership
83. Occupational Therapy



were recruited directly from university or college.

Business

In the Business group of Classifications, there is stronger evidence of recruitment directly from one of the listed types of educational institutions. About one-quarter of the Secretarial Classification and about 20 per cent of those currently employed in the Insurance and the Institutional Food Service Management Classifications were recruited directly from high school. Almost this percentage went directly from junior college into the Small Business Administration and Banking Classifications. University and college accounted for the direct recruitment of a somewhat larger percentage for both of these Classifications, however. About 20 per cent of those currently employed by responding firms in the Classification of Art--Commercial and Technical were also recruited directly from university or college.

Applied Science Technologies

Numbers equal to 30 per cent or more of the currently employed in the following Classifications were recruited directly from high school: Air Conditioning and Refrigeration, Civil Technology--Cartography, Photogrammetry, Highway Design Sub-Groups, and Printing and Graphic Arts. About one-quarter of those in Photography came from this recruitment source.

Directly recruited from the junior college level were about one-fourth to one-fifth of those currently employed in TV Broadcasting--Technical, Chemical Technology, Tool Design, and Pure Science Technology--Biology, Chemistry, Physics. The university or college accounted for about this same percentage range with Building Construction, TV Broadcasting--Technical, Architectural Technology, and Tool Design.

Public Service

Respondents employing Occupational Therapists indicated that 80 per cent of those currently employed were recruited directly from high school. Almost half of those in Recreational Leadership came directly from junior college; about 20 per cent of those in Nursery School Education came from this same source. University and college was indicated as the immediate source of about one-fifth of those currently employed in the Library Assisting and Recreational Leadership Classifications.

SEX PREFERENCE

Respondents were asked to answer the following question with regard to each of the Classifications they listed: "If available and comparably trained, would you employ for this Classification men only, women only, or both?" The tri-partite bars shown in Chart XII indicate from top to bottom these three categories of answers, each expressed as a percentage of the total answers given by firms responding about each respective Classification.

Medical Auxiliary Technologies

Understandably in these types of technologies, where a preference was expressed it was for women. On the other hand, half or more of the respondents indicated that they would find either sex satisfactory in the fields of Medical Technology, Medical Records Librarian, Psychiatric Aide, and Physiotherapy. All of the responding employers recorded "both" when asked to answer this question for X-Ray Technology.

Business

In this general area, either men or women were acceptable to most employers in most of these Classfications, the principal exception

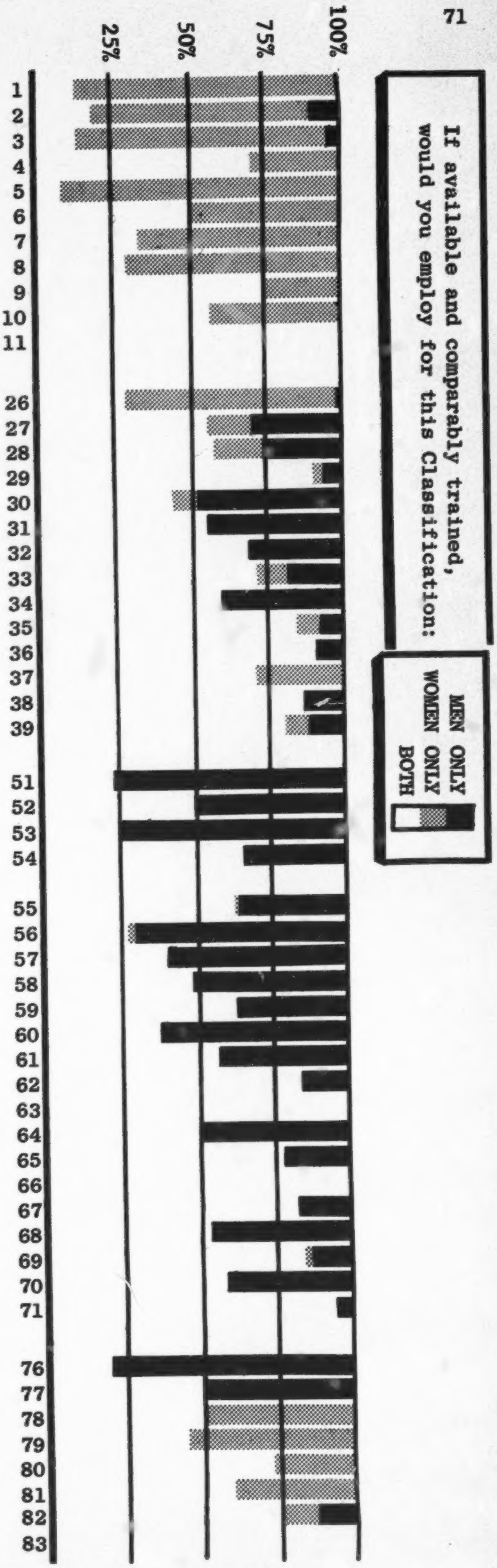
CHART XII. For Each Classification, Percentage Distribution of Respondents According to Sex of Employee Preferred for That Classification.

A. Medical Auxiliary Technologies
  1. Dental Assisting
  2. Dental Hygiene
  3. Medical Assisting
  4. Medical Technology
  5. Medical Secretarial
  6. Medical Records Librarian
  7. Nursing, 2 Year RN
  8. Nursing, Licensed Practical
  9. Psychiatric Aide
  10. Physiotherapy
  11. X-Ray Technology

B. Business
  26. Secretarial (General, Legal, Technical)
  27. Executive Administrative Aide
  28. Personnel Management
  29. Electronic Data Proc.-Business Applications
  30. Small Business Administration
  31. Banking
  32. Insurance, Casualty and Surety
  33. Real Estate
  34. Interior Design and Decorating
  35. Food Management
  36. Hotel and Restaurant Management
  37. Institutional Food Service Management
  38. Art (Commercial and Technical)
  39. Accounting

C. Applied Science Technologies
  51. Air Conditioning and Refrig. Technology
  52. Architectural Technology
  53. Building Construction Technology
  54. Civil Technology (Cartography, Photogrammetry, Highway Design Sub-groups)
  55. Engineering Drafting and Design
  56. Mechanical Technology
  57. Tool Design
  58. Instrumentation Technology
  59. Quality and Cost Control
  60. Electrical Technology
  61. Electronic Technology
  62. R & D Electronic Data Processing
  63. Nuclear Technology
  64. Radiation Technology
  65. Space Technology
  66. TV Broadcasting, Technical
  67. Photography
  68. Printing and Graphic Arts
  69. Technical Report Writing
  70. Chemical Technology
  71. Pure Science Tech. (Biology, Chemistry, Physics)

D. Public Service
  76. Law Enforcement (Police Training)
  77. Public Administration
  78. Social Welfare Assisting
  79. Nursery School Education
  80. Library Assisting
  81. Teacher's Aide (Instruc. Material Asstg.)
  82. Recreational Leadership
  83. Occupational Therapy



being Secretarial where about 60 per cent of the respondents expressed a preference for women.

Applied Science Technologies

Chart XII shows that here the situation is almost the reverse of that with the Medical Auxiliary Technologies: where a preference was expressed, it was definitely for men. At the same time, for every single Classification there were some responding employers who indicated that either sex would be acceptable to them if available and comparably trained.

Public Service

Here again, at least 50 per cent of the employers in most of these Classifications expressed a willingness to hire either sex. Where a preference was expressed, it was for men in the Law Enforcement--Police Training and the Public Administration Classifications, and for women in the other Classifications.

In the summary of his Technical Training in the United States Lynn A. Emerson said, "If maximum potential enrollments are to be attained, greatly increased numbers of young women will need to be enrolled in post secondary occupational training programs." As noted above, some employers in every one of the 54 Classifications indicated a willingness to employ either men or women. On the other hand, men were still preferred over women in the Applied Science and Business fields, while women were preferred in the Medical Auxiliary and most of the Public Service categories.

EMPLOYEES EARNING COLLEGE CREDIT

On page 4 of the Questionnaire (see Appendix A) may be found several general questions asked of all respondents, regardless of which Classifications they had indicated inside on the Information Chart. Chart XIII shows the percentage of affirmative answers to the first question: "Would your establishment be interested in working with Montgomery Junior College in setting up an educational program that would enable your technical and semi-professional employees to earn college credit?"

Answers given by respondents have been distributed according to major type of business. The bars to the left of center on this graph show the total number of firms in each of the major categories of business, and the lighter bars overlaid toward the center of the page show the number of firms from each group responding in the affirmative to this question. To the right of center is shown the percentage of responding firms in each major type of business answering "Yes". Thus the right of the graph details the ratio of the lighter bar to the solid bar.

A total of 127 or 23 per cent of the 551 responding firms answered this question in the affirmative. Only the Professional and Allied Services group included fewer than 15 per cent of the responding employers.

COOPERATIVE WORK EXPERIENCE PROGRAM

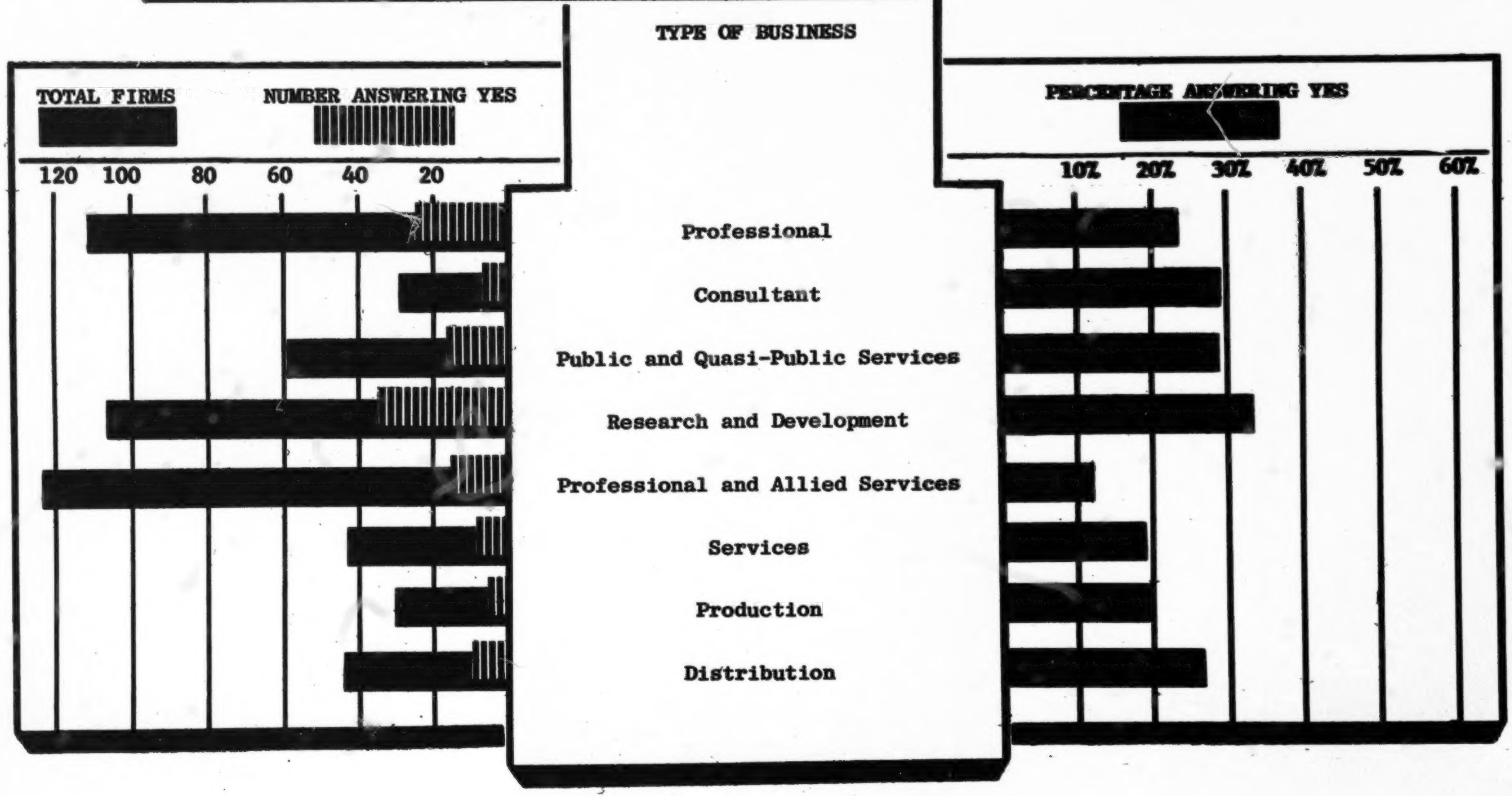
Each responding employer was also asked to answer this question: "Would your establishment be interested in participating with Montgomery Junior College in a Cooperative Work Experience Program for technical and

CHART XIII. Distribution According to Type of Business of Respondents Answering This Question: "Would your establishment be interested in working with Montgomery Junior College in setting up an educational program that would enable your technical and semi-professional employees to earn college credit?"

Number of Responding Firms in Each Category of Business; also, Number and Percentage of Respondents Answering YES.

Would your establishment be interested in working with Montgomery Junior College in setting up an educational program that would enable your technical and semi-professional employees to earn college credit?

☑ YES
☐ NO



semi-professional personnel?" Chart XIV shows the number, percentage, and affirmative answers distributed according to business types of the 551 respondents.

One-third of the total group of respondents (174) answered this question in the affirmative. In addition, many Questionnaires contained detailed comments related to such a possibility.

As indicated earlier in Chart III, those firms in the Public and Quasi-Public Services and the Research and Development business categories together contributed by far the largest numbers of employees: 131,770, or 86 per cent of the grand total. Almost 40 per cent of the firms in each of these two categories, or a total of 63 firms, expressed an interest in participating with Montgomery Junior College in a Cooperative Work Experience Program. In no major type of business did less than 20 per cent of the firms answer this question in the affirmative.

COOPERATIVE WORK EXPERIENCE PROGRAM--SUMMER EMPLOYMENT

A total of 119 firms, constituting 22 per cent of the 551 responding establishments, said that trainees could be placed in their firms for summer employment as part of a Cooperative Work Experience Program.

As may be seen in Chart XV, the largest percentages of affirmative answers were found for the Consultant, Public and Quasi-Public Services, Distribution, and Research and Development categories of business.

COOPERATIVE WORK EXPERIENCE PROGRAM--PART-TIME EMPLOYMENT

Respondents were also asked whether Cooperative Work Experience

CHART XIV. Distribution According to Type of Business of Respondents Answering This Question: "Would your establishment be interested in participating with Montgomery Junior College in a Cooperative Work Experience Program for technical and semi-professional personnel?"

Number of Responding Firms in Each Category of Business; also, Number and Percentage of Respondents Answering YES.

Would your establishment be interested in participating with Montgomery Junior College in a Cooperative Work Experience Program for technical and semi-professional personnel?

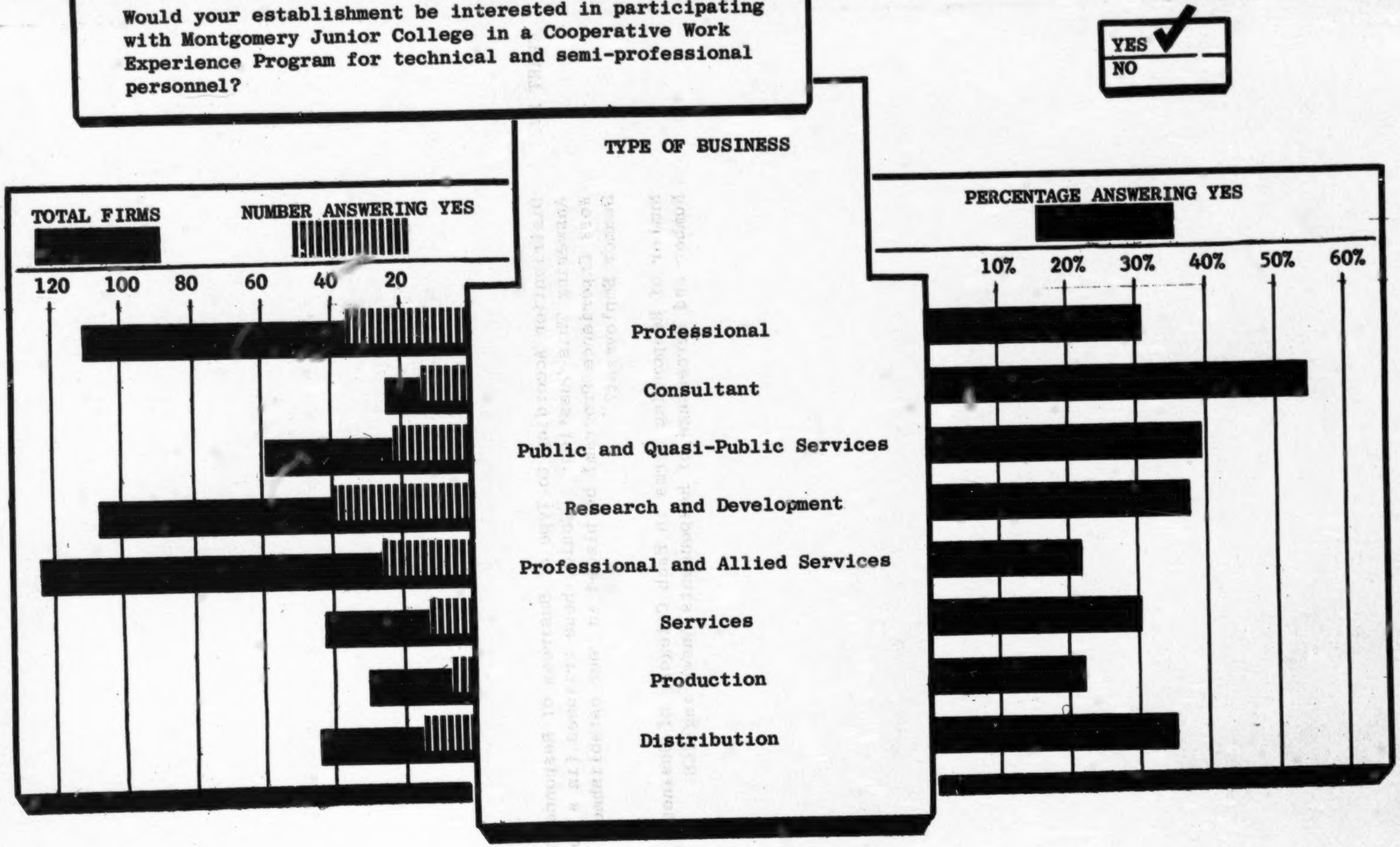


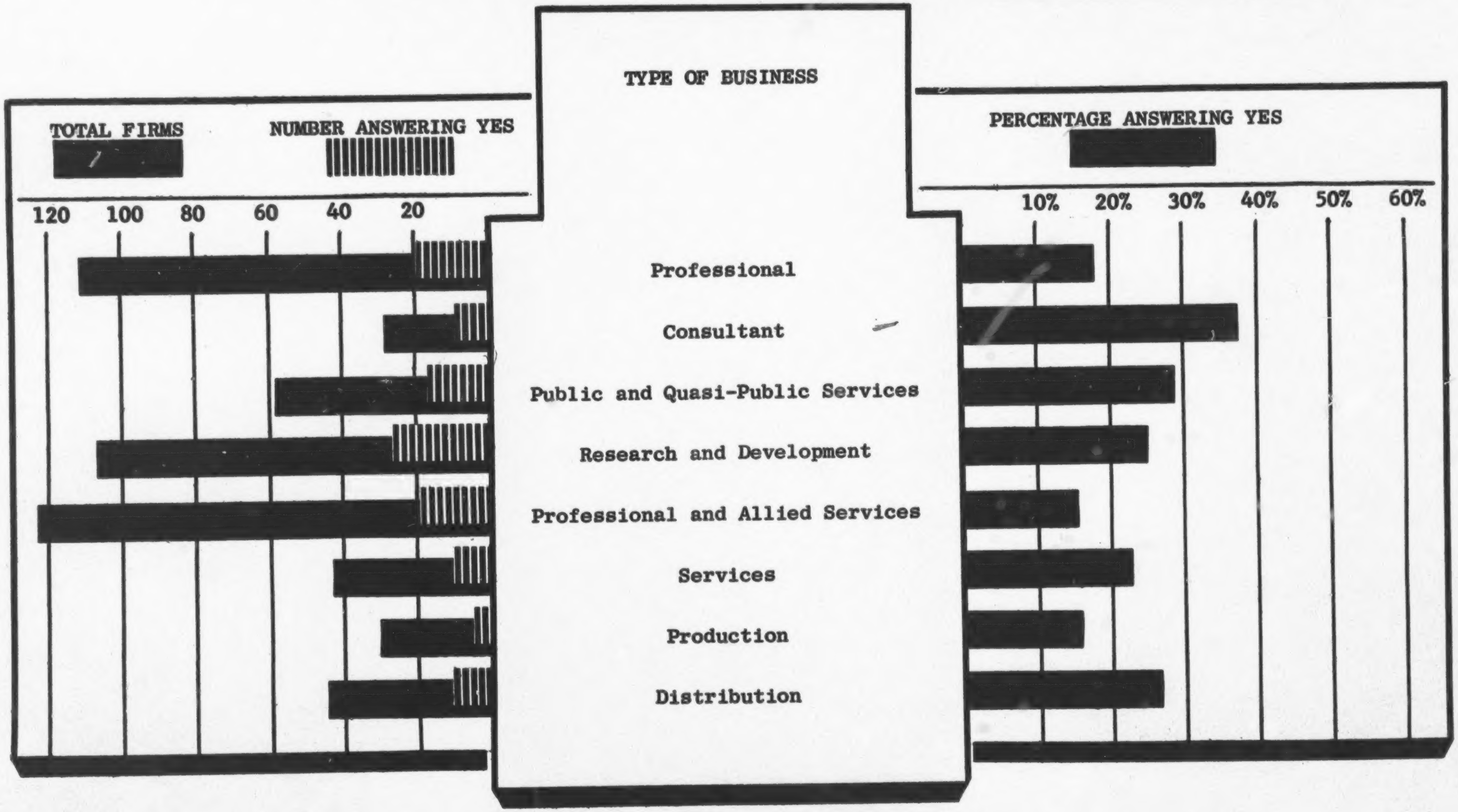
CHART XV. Distribution According to Type of Business of Respondents Answering This Question: "Could these trainees (in a Cooperative Work Experience Program) be placed in your establishment for Summer Employment?"

Number of Responding Firms in Each Category of Business; also, Number and Percentage of Respondents Answering YES.

Would your establishment be interested in participating with Montgomery Junior College in a Cooperative Work Experience Program for technical and semi-professional personnel?

If YES, could these trainees be placed in your establishment for:

✓ Summer employment?



trainees could be placed in their respective establishments for part-time work during the school year.

A total of 122 firms, constituting 22 per cent of the total group of 551 respondents, answered this question in the affirmative. The distribution of these answers according to major types of business is shown in Chart XVI. Consultant, Public and Quasi-Public Services, Distribution, and Research and Development types of establishments showed the highest percentages of affirmative answers.

COOPERATIVE WORK EXPERIENCE PROGRAM--FULL-TIME EMPLOYMENT

A third way in which students might obtain their work experience in a cooperative type of program was suggested to respondents: full-time work during the school year for a limited period--for example, one semester of full-time work alternated with one semester in school.

Relatively speaking, employers showed the least interest in this type of Cooperative Work Experience plan, although 93 firms, or 17 per cent of the 551 responding establishments did reply to this alternative in the affirmative. Chart XVII shows the distribution of these answers according to type of business of the respondents.

Again the Consultant, Public and Quasi-Public Services, and Research and Development firms showed the largest percentages interested in participating in a Cooperative Work Experience type of program. A total of 50 firms from these three categories of business alone answered this question in the affirmative.

CHART XVI. Distribution According to Type of Business of Respondents Answering This Question: "Could these trainees (in a Cooperative Work Experience Program) be placed in your establishment for Part-Time Work during the school year for a limited period?"

Number of Responding Firms in Each Category of Business; also, Number and Percentage of Respondents Answering YES.

Would your establishment be interested in participating with Montgomery Junior College in a Cooperative Work Experience Program for technical and semi-professional personnel?

If YES, could these trainees be placed in your establishment for:

✓ Part-time work during the school year?

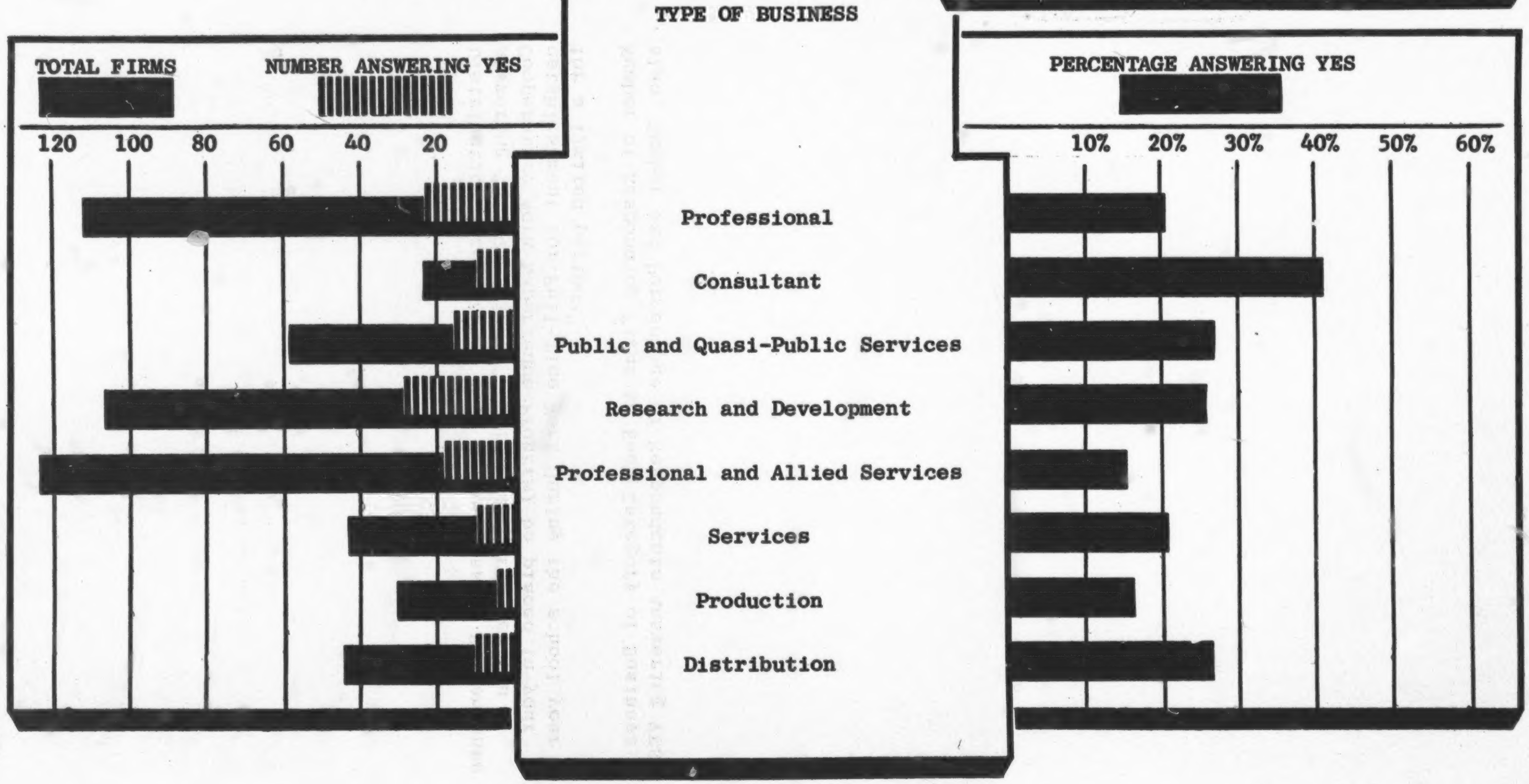


CHART XVII. Distribution According to Type of Business of Respondents Answering This Question: "Could these trainees (in a Cooperative Work Experience Program) be placed in your establishment for Full-Time Work during the school year for a limited period?"

Number of Responding Firms in Each Category of Business; also, Number and Percentage of Respondents Answering YES.

Would your establishment be interested in participating with Montgomery Junior College in a Cooperative Work Experience Program for technical and semi-professional personnel?

If YES, could these trainees be placed in your establishment for:

✓ Full-time work during the school year for a limited period (for example, one semester of full-time work alternated with one semester of schooling)?

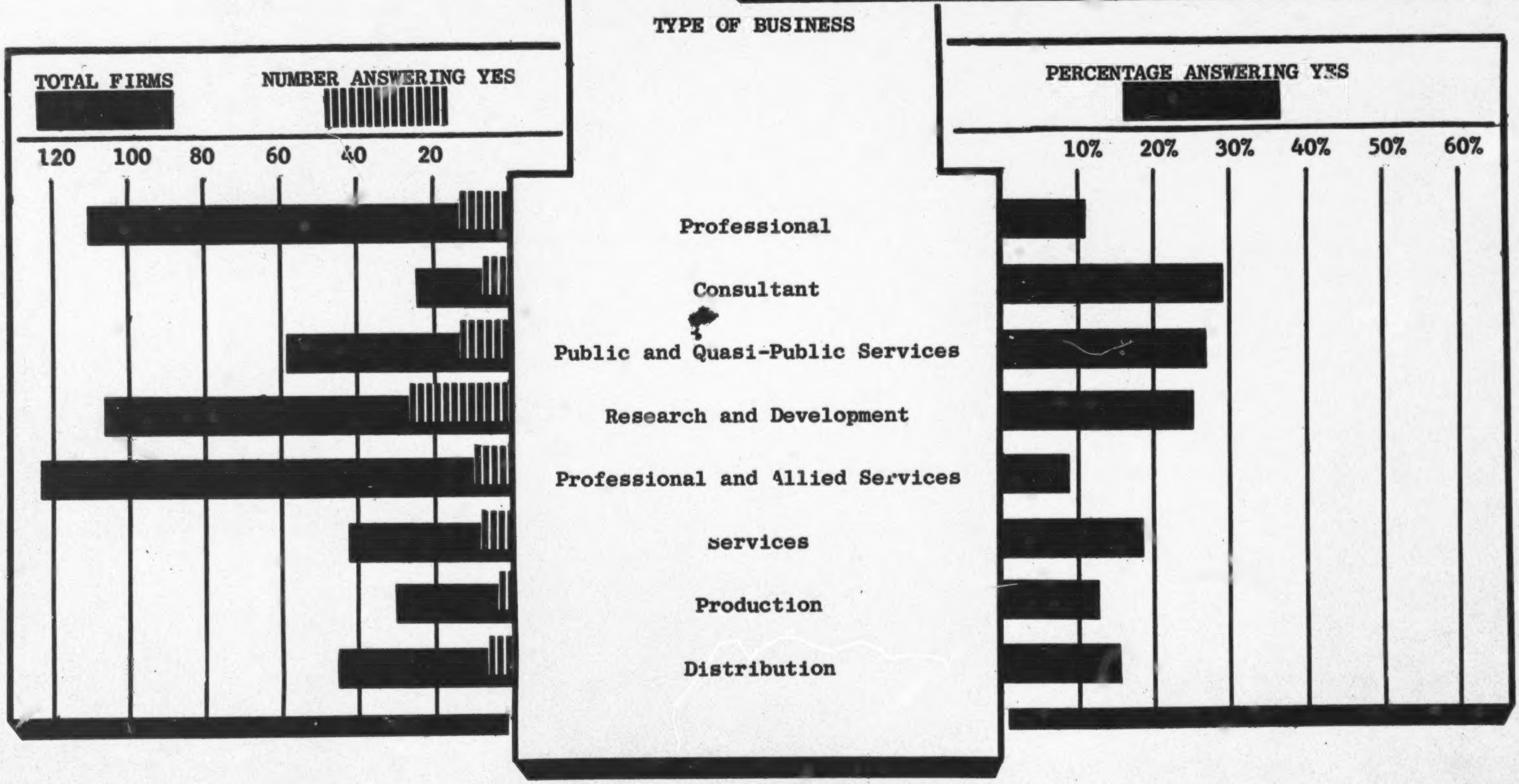


Table VI gives summary information about the Cooperative Work Experience interests of the two business categories employing the vast majority of employees found in the 551 firms responding to this Survey. More Research and Development firms were interested in each type of cooperative program, but undoubtedly this is related to the fact that this business category included almost twice as many responding firms as did the Public and Quasi-Public Services category.

TABLE VI

Interested in---	Public and Quasi-Public Services Firms	Research and Development Firms
Cooperative Program ---Summer	17	27
Cooperative Program ---Part-Time	16	28
Cooperative Program ---Full-Time	16	27

Number of Firms Expressing Interest in Participating in a Cooperative Work Experience Program with Montgomery Junior College
--in the two Business Categories which together employed 131,770 (86 per cent) of the 153,886 persons currently employed in all 551 responding firms

APPENDIX A

1. Questionnaire for the Technical and Semi-Professional Employment Survey

2. Descriptions of Classifications*

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*The Classification Descriptions are referred to as "blue sheets" both in the Questionnaire instructions and in the text of this report. Actually, all pages in this report are white, including those in the Appendices. The original Descriptions mailed along with the Questionnaire were printed on blue, however, to facilitate data collection.

Montgomery Junior College

TAKOMA PARK, MARYLAND

TECHNICAL AND SEMI-PROFESSIONAL EMPLOYMENT SURVEY

IDENTIFYING INFORMATION

Name of firm or establishment ______________________________

Type of business ______________________________

Address ______________________________ Phone ______________

Form completed by ______________________ Title ______________________

Total number of persons currently employed in your establishment ______________

INSTRUCTIONS

On page 2 you will find a list of job Classifications generally requiring not more than two years of college education. These Classifications are being tentatively considered as areas for curriculum development at Montgomery Junior College.

1. Based on the experience of your establishment, please circle on page 2 all those Classifications which if offered as a two-year college program at Montgomery Junior College would fulfill a genuine educational need in the metropolitan Washington area. (For your convenience only, brief descriptions of these Classifications may be found on the enclosed blue sheets.)

2. Before each Classification on page 2 you will find a number. Write the identifying number for each circled Classification in one of the boxes at the top of the Information Chart on page 3.

3. Down the left margin of the Information Chart you will find several questions. For each Classification chosen (indicated by the number you have placed in the box above), answer these questions in the column below that particular box.

4. When you have finished the Information Chart, please be sure to answer the questions on page 4.

5. Place the completed survey form in the postage-free envelope provided, and mail it back to Montgomery Junior College. Please return this questionnaire as early as possible.

6. If we may answer questions, or assist you in any way, please call Dr. Eileen Kuhns at 587-0415, extension 44. (For example, you may select more Classifications than the number of boxes provided on the Information Chart, and thus need to phone for an additional survey form.)

7. Thank you very much for your cooperation. It is our hope that the long-range results of this survey will prove beneficial to you as an area employer.

CLASSIFICATIONS*

A. Medical Auxiliary Technologies

1. Dental Assisting
2. Dental Hygiene
3. Medical Assisting
4. Medical Technology
5. Medical Secretarial
6. Medical Records Librarian
7. Nursing, 2 Year RN
8. Nursing, Licensed Practical
9. Psychiatric Aide
10. Physiotherapy
11. X-Ray Technology

B. Business

26. Secretarial (General, Legal, Technical)
27. Executive Administrative Aide
28. Personnel Management
29. Electronic Data Processing-Business Applications
30. Small Business Administration
31. Banking
32. Insurance, Casualty and Surety
33. Real Estate
34. Interior Design and Decorating
35. Food Management
36. Hotel and Restaurant Management
37. Institutional Food Service Management
38. Art (Commercial and Technical)
39. Accounting

C. Applied Science Technologies

51. Air Conditioning and Refrigeration Technology
52. Architectural Technology
53. Building Construction Technology
54. Civil Technology (Cartography, Photogrammetry, Highway Design Sub-groups)
55. Engineering Drafting and Design
56. Mechanical Technology
57. Tool Design
58. Instrumentation Technology
59. Quality and Cost Control
60. Electrical Technology
61. Electronic Technology
62. R & D Electronic Data Processing
63. Nuclear Technology
64. Radiation Technology
65. Space Technology
66. TV Broadcasting, Technical
67. Photography
68. Printing and Graphic Arts
69. Technical Report Writing
70. Chemical Technology
71. Pure Science Technology (Biology, Chemistry, Physics)

D. Public Service

76. Law Enforcement (Police Training)
77. Public Administration
78. Social Welfare Assisting
79. Nursery School Education
80. Library Assisting
81. Teacher's Aide (Instructional Materials Assisting)
82. Recreational Leadership
83. Occupational Therapy

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*Many of these Classification titles also refer to full professional positions requiring considerably more than two years of College education. In such cases reference here is made not to the professional person, but rather to technical or semi-professional personnel who will be trained in supportive jobs assisting the professional.

INFORMATION CHART

1. Would a person with two years of specialized college training satisfy your job requirements in this Classification? (If this answer is YES, complete all questions for this Classification. If NO, proceed immediately to the next Classification you have listed.)	YES							
	NO							
2. Number of persons in this Classification currently employed by your concern.								
3. Estimated total number of job openings to be filled by your firm in this Classification during the next 5 years.								
4. Number of vacancies in this Classification you are currently trying to fill.								
5. Is this a "hard to fill" job? (Check YES if vacancies usually take over 30 days to fill, or if the majority must be recruited from outside the metropolitan Washington area.)	YES							
	NO							
6. Does your establishment conduct an organized training program for this Classification?	YES							
	NO							
7.a. What percentage of persons in this Classification do you currently recruit by up-grading present employees through on-the-job training or in-plant education?								
b. What percentage do you recruit directly from:	HIGH SCHOOL							
	JUNIOR COLLEGE							
	UNIV. or COLL.							
	OTHER							
	TOTAL	100%	100%	100%	100%	100%	100%	100%
8. If available and comparably trained, would you employ for this Classification:	MEN ONLY							
	WOMEN ONLY							
	BOTH							

1. Would your establishment be interested in working with Montgomery Junior College in setting up an educational program that would enable your technical and semi-professional employees to earn college credit?

YES ____
NO ____

2. Would your establishment be interested in participating with Montgomery Junior College in a Cooperative Work Experience Program for technical and semi-professional personnel?

YES ____
NO ____

If YES, could these trainees be placed in your establishment for:

Summer employment? YES NO

Part-time work during the school year? YES NO

Full-time work during the school year for a limited period (for example, one semester of full-time work alternated with one semester of schooling)? YES NO

3. To assist in training your technical or semi-professional employees, are there additional courses or programs which should be added to the offerings of Montgomery Junior College? ____________________

Write here any additional comments you may care to make:

THANK YOU AGAIN FOR YOUR COOPERATION IN ANSWERING THIS QUESTIONNAIRE!

CLASSIFICATIONS

A. Medical Auxiliary Technologies

1. DENTAL ASSISTING - The graduate is certified to work with the dentist and under his supervision in three main areas: In his business office by handling appointments, the telephone, bills, and correspondence; at the chairside by assisting the dentist; and in the laboratory by pouring models, casting inlays, and performing other similar functions.

2. DENTAL HYGIENIST - The graduate is licensed to perform prophylaxis, to take and process dental radiographs, and to instruct in dental health education with patients. The dental hygienist may work either in a dental office or in schools.

3. MEDICAL ASSISTING - Prepares the graduate to assist the physician in the office, the examining room, and the laboratory. Maintains medical records, receives patients, makes appointments, keeps accounts, handles insurance and hospitalization forms, may take dictation. Assists the doctor during examinations. Under supervision may assist with basal metabolism tests, electrocardiograms, blood counts and urinalyses. Assists in medical offices, clinics, or hospitals.

4. MEDICAL TECHNOLOGY - Prepares for licensure, after which the graduate may perform the various chemical, microscopic, bacteriological and other medical laboratory procedures used in the diagnosis, study and treatment of disease, under the supervision of a pathologist or other qualified physician.

5. MEDICAL SECRETARIAL - Prepares the graduate not only in the range of basic secretarial skills, but also in specialized terminology, office and laboratory procedures, and maintenance of medical records, which will qualify her for secretarial positions in physicians' offices, clinics, hospitals, and the medical departments of large corporations.

6. MEDICAL RECORDS LIBRARIAN - Prepares the graduate to keep medical records of patients admitted to hospitals and clinics; to compile reports of admissions, births, deaths, transfers, and discharges; to maintain permanent files for record purposes; to do indexing and coding of primary and secondary diagnoses of medical histories and records following established library methods.

7. NURSING, 2 YEAR RN - A relatively new development in medical auxiliary education, this program prepares the graduate to become a registered nurse; to perform bedside nursing duties requiring prescribed education, skills, and hospital experience in the care of ill and injured persons.

8. NURSING, LICENSED PRACTICAL - This program prepares the student for licensure as a practical nurse. This semi-professional graduate works under the supervision of a physician and/or professional nurse. As a member of this medical team the practical nurse performs personal nursing care, gives some medications, charts patients' records, and renders assistance in all the basic fields of nursing and related housekeeping functions.

9. PSYCHIATRIC AIDE - Prepares the graduate to work under supervision as the semi-professional member of a medical team which includes the psychiatrist, psychologist, and psychiatric social worker; to assist in creating a therapeutic climate, along with these professionals who are concerned with the hospital care and treatment of persons suffering from mental illness or severe emotional maladjustment.

10. PHYSIOTHERAPY - Under supervision the graduate assists the professional physiotherapist in the treatment of the patient's bodily disorders, gives exercises designed to correct the patient's muscle ailments and deficiencies, administers massage and performs other body manipulations, gives hydrotherapeutic treatments, uses various mechanical devises for therapeutic purposes.

11. X-RAY TECHNOLOGY - Prepares the graduate to perform under medical supervision a variety of duties related to the diagnostic and therapeutic utilization of X-ray equipment; to X-ray internal parts of the body in order to detect injury, the presence of foreign matter, malformation or malfunctioning; to assist in fluoroscopy; to assist radiologists in the preparation and use of radioactive materials; to process film and keep records of services performed for patients.

B. Business

26. SECRETARIAL (GENERAL, LEGAL, TECHNICAL) - The graduate is prepared to perform general office work requiring the skills of typing, shorthand, bookkeeping, filing, and the use of office machines; to handle business correspondence, some of it independently; to make appointments and otherwise assist the executive in the use and conservation of his time; to answer and place phone calls; to keep office records; and to supervise other clerical employees. The legal secretary in addition is knowledgeable with regard to legal terms and procedures, while the technical secretary is familiar with the specialized terminology of medical, scientific, or industrial discourse.

27. EXECUTIVE ADMINISTRATIVE AIDE - Prepares the graduate to execute administrative policies determined by, or in conjunction with, other officials; to speak for the executive in his absence; to write memoranda outlining and explaining administrative procedures and policies to subordinate supervisory workers; to act as intermediary between minor supervisors and policy-making officials; to keep special files; to perform publicity work.

28. PERSONNEL MANAGEMENT - The graduate is prepared to assist in the selection, training, promotion, welfare, compensation and recreation of employees, and in other employer-employee relationships. The scope of personnel work and the duties and responsibilities vary widely in different establishments, depending upon the policies of the management.

29. ELECTRONIC DATA PROCESSING, BUSINESS APPLICATIONS - Prepares the graduate to assist in the semi-professional operation and maintenance of electronic data processing equipment which is used to carry out a variety of functions in commercial and industrial establishments.

30. SMALL BUSINESS ADMINISTRATION - Prepares the graduate to conduct his own business, and to assist in the efficient management and functioning of small commercial and industrial concerns; provides preparation for accounting, selling, production, and distribution operations.

31. BANKING - The graduate may perform under supervision the detailed operations carried out by banking and related establishments in dealing with customers' commercial accounts, the approval of loans, the collection of debts due the bank, the appraisal, buying and selling of collateral, the movement of securities, the planning of estates, and more generally with corporation finance, stocks and bonds, credits and collections, and saving and loan aspects of the banking business.

32. INSURANCE, CASUALTY AND SURETY - Prepares the graduate for broker's licensure, and for work with insurance agencies, companies, and other organizations in selling, inspection, accounting, promotion, and underwriting related to insurance coverage against losses and insurance coverage provided by workmen's compensation, liability, automobile, aviation, marine, fire and allied lines, accident and health, theft, boiler and machinery insurance.

33. REAL ESTATE - Prepares the graduate for salesman's and broker's licensure, and for appraisal of property leading to professional designations; to sell, purchase, exchange, lease, rent, and manage real property.

34. INTERIOR DESIGN AND DECORATING - Prepares the student to design and arrange domestic and commercial interiors, taking into account the coordination of furniture, textiles, accessories, lighting, and other pertinent factors in interior design. Also knowledgeable with regard to business and marketing procedures, graduates may estimate costs, present room renderings to clients for approval, and make necessary purchases.

35. FOOD MANAGEMENT - Prepares the graduate to direct the operation of a retail or wholesale food establishment and to be responsible for its profitable operation. Supervises selling, maintenance and clerical employees; makes reports, takes and verifies inventories; purchases or requisitions goods; handles receipts; supervises suitable maintenance of premises and stock; assigns duties; and promotes sales.

36. HOTEL AND RESTAURANT MANAGEMENT - The graduate assists in planning menus, purchasing food, maintaining sanitation in food service departments, requisitioning replacements of food service equipment, keeping inventories, issuing supplies, calculating daily costs, keeping accounts and records, compiling financial reports, cashiering and handling money.

37. INSTITUTIONAL FOOD SERVICE MANAGEMENT - Prepares graduates for supportive administrative positions in places where large groups of people are served. Industrial cafeterias, school cafeterias, college food services, hospitals, commercial restaurants, cafeterias, snack bars and other public eating places comprise parts of the industry that is devoted to feeding people away from home.

38. ART, COMMERCIAL AND TECHNICAL - Prepares the graduate to create and design layouts for commercial purposes; to design and prepare charts, diagrams, sketches, maps for publication and exhibition. The technical artist may illustrate industrial or mechanical procedures and equipment for the use of workers who cannot read blueprints, and to facilitate production.

39. ACCOUNTING - Prepares graduates to work under supervision in general accounting, budget, and cost systems; to maintain accounts and records, balance books periodically, prepare statements and interpret accounts for administrative officers; to prepare Federal, state, and local tax returns.

C. Applied Science Technologies

51. AIR CONDITIONING AND REFRIGERATION TECHNOLOGY - Prepares students to meet the requirements of the various branches of the refrigeration industry; under supervision to design systems for specific applications. Graduates may install, maintain, repair equipment used in refrigerating plants and for conditioning air and cooling water in commercial buildings, manufacturing establishments, and homes.

52. ARCHITECTURAL TECHNOLOGY - Prepares the graduate to assist the professional architect in planning, design, and on-the-job supervision of construction for residences, and commercial, industrial, and municipal structures. Under supervision graduates prepare cost estimates, write specifications, render sketches of proposed buildings, and prepare detail drawings to be used by building contractors and craftsmen.

53. BUILDING CONSTRUCTION TECHNOLOGY - Prepares the graduate to assist in the supervision and inspection of work involved in construction; to work with skilled artisans, contractors, architects, and professional designers; to perform routine duties such as field surveying, construction layout, and inspection; to give clerical assistance; to make estimates and render detail drawings under supervision; to keep engineering records.

54. CIVIL TECHNOLOGY (CARTOGRAPHY, PHOTOGRAMMETRY, HIGHWAY DESIGN SUB-GROUPS) - The graduate is prepared to assist the engineer in the planning and supervision of lay-out and construction of streets, highways, railroads, bridges, dams, and urban and suburban development and re-development projects; to create, draw, and copy maps, using drafting and drawing instruments, aerial photography, and other appropriate techniques; to estimate costs, prepare specifications, participate in surveying; to assist in scheduling construction activities and inspecting work for conformance with blueprints and specifications.

55. ENGINEERING DRAFTING AND DESIGN - Prepares the student to work with engineers in projects of research, design, and development, utilizing knowledge obtained concerning machine and tool design, technical sketching, detail and assembly drawing, materials testing, metal production, metal working, heat treating, alloys and other aspects of metallurgy.

56. MECHANICAL TECHNOLOGY - The graduate is prepared to assist the professional engineer in the design of tools, engines, machines, or industrial equipment, the installation and maintenance of industrial equipment, the supervision of mechanical industrial processes, the planning and operation of central distribution systems for heat, gas, water, or steam.

57. TOOL DESIGN - Prepares the graduate to design tools and devices for the mass production of manufactured articles; to originate and prepare sketches of designs for cutting tools, jigs, dies, special fixtures, and other attachments used in machine operations; to render detail drawings of tools and fixtures; to re-design tools currently in use to improve their efficiency.

58. INSTRUMENTATION TECHNOLOGY - Prepares the graduate to assist the professional in the design, supervision, and maintenance of electrical, mechanical, and thermal instruments and control equipment necessary for the safe and efficient operation of industrial plants; under supervision to perform supportive work involving research, development, or application of techniques of sensing, measuring, transporting, recording, reducing, or reading out data, or controlling the physical conditions required in the conduct of aerospace scientific and technological programs.

59. QUALITY AND COST CONTROL - Prepares the graduate to assist in the collection and statistical analysis of data concerning industrial products in order to reduce costs and maintain quality; to utilize acceptance sampling theory and related statistical techniques; to use measuring gauges and other precision instruments for determining quality; under supervision to prepare recommendations resulting from data collection and analysis.

60. ELECTRICAL TECHNOLOGY - Prepares the graduate to assist the professional in planning and supervision of construction and operation of electric power generating plants, transmission lines, distribution systems, illumination, wire communication, and electric transportation systems; to be knowledgeable concerning the manufacture of various types of electrical machinery and apparatus, including motors and generators, converters and regulators, and switch-gear equipment.

61. ELECTRONIC TECHNOLOGY - The graduate is prepared to work with engineers and physical scientists in the field of electronics which includes radio, radar, sonar, telemetering, television, and other forms of communication; industrial measuring, recording, and controlling devices; navigational equipment; missile and spacecraft guidance systems; electronic computers; and many other types of equipment using vacuum tubes and semiconductor circuits.

62. R & D ELECTRONIC DATA PROCESSING - Prepares the graduate to assist the professional in project planning, problem formulation, system design, programming, production, and related services such as maintenance, and operation of library facilities.

63. NUCLEAR TECHNOLOGY - Prepares the graduate for developmental and research activities in nuclear energy; to assist in building, operating, and servicing reactors; to maintain reactor facilities, fuel processing plants, and research and development centers; to observe safety precautions, especially with regard to radiation hazards.

64. RADIATION TECHNOLOGY - Prepares the graduate to monitor radiation-producing machines and radioactive source materials used in research, industry, and hospitals, and produced in nuclear reactor operations; to monitor medical and dental X-ray installations; to inspect radiation protection devices such as shielding and contamination barriers; to prepare and analyze environmental samples for radioactivity content; to detect and measure various types of radiation; to perform decontamination procedures and take emergency measures where radiation exposure constitutes a hazard to personnel; to calibrate and help maintain radiation detection equipment; to prepare reports on the results of surveys and laboratory tests.

65. SPACE TECHNOLOGY - Prepares the graduate to perform semi-professional work in research, development, design, application, or operations pertaining to an aerospace mission, program, or project; to be knowledgeable concerning one or more of the following aerospace technology specialties: space sciences, life sciences and systems, fluid and flight mechanics, materials and structures, propulsion and power, flight systems, measurement and instrumentation systems, data systems, experimental facilities and equipment, and research piloting.

66. TV BROADCASTING, TECHNICAL - Prepares the graduate to supervise the operation of technical equipment, and to instaff, maintain, and repair the many types of electrical and electronic equipment required for television broadcasting, including both studio and remote operations; to tune the transmitter for the most efficient operation within established legal limits.

67. PHOTOGRAPHY - The graduate is prepared for portrait, commercial, industrial, press, aerial, educational, and scientific photography, including the proficient operation of cameras and auxiliary equipment, and the technical processing operations involved in the developing, enlarging, and printing of the finished products.

68. PRINTING AND GRAPHIC ARTS - Prepares the graduate to work directly or to supervise others in both the technical and the business aspects of the printing industry. Students learn to perform and supervise the various design, composition, platemaking, and presswork operations involved in letterpress, lithography (offset printing), gravure, and screen process; to order printing supplies; to estimate costs for sales purposes: to measure and scale copy, use tables, charts, and other devices for calculating time factors and production costs for a variety of printing jobs.

69. TECHNICAL REPORT WRITING - The graduate is prepared to edit or revise proposed or previously published data. Compiles various types of instructional manuals, reports, bulletins, specifications, catalogs, or other written data pertaining to maintenance, manufacturing, research, experimental engineering and general technological practice and procedure.

70. CHEMICAL TECHNOLOGY - Prepares the graduate to assist chemists and other scientists or engineers in research and development, testing, or other laboratory work; to make computations and tabulate and analyze results; to perform qualitative and quantitative chemical analyses; to assemble and use appropriate chemical laboratory equipment and instruments; to maintain industrial chemical quality control.

71. PURE SCIENCE TECHNOLOGY (BIOLOGY, CHEMISTRY, PHYSICS) - Prepares the graduate to work directly with professionals in the physical and life sciences, in jobs which require the ability to analyze and solve problems and prepare formal reports on experiments, tests, and other projects; to carry out tasks which are technical in nature, but are supportive to, and more limited than those of the scientist, and have a more practical orientation; to be knowledgeable concerning the basic sciences and mathematics.

D. Public Service

76. LAW ENFORCEMENT (POLICE TRAINING) - Prepares the graduate for positions in law enforcement at the local, state, and federal levels, and with private agencies. Students receive instruction in police administration, scientific investigation, traffic control, laws of arrest, search and seizure, state criminal laws and local ordinances, patrol procedures, accident investigation, individual civil rights, and the prevention as well as control of juvenile and adult delinquency and crime.

77. PUBLIC ADMINISTRATION - Training in this field prepares the graduate for semi-professional positions in local, state, or federal government organizations, performing such diverse functions as police administration, delinquency control, city management and planning, personnel management, security relations, financial management, budgeting, recreation, fire control, and sanitation.

78. SOCIAL WELFARE ASSISTING - Prepares the student to assist professional staff members in their work with people who have individual or family problems, or who are served by preventive community programs. In this supportive capacity, social welfare aides thus free the professional's time for services requiring higher levels of professional preparation.

79. NURSERY SCHOOL EDUCATION - Prepares the graduate to assist the professional teacher in the care and early education of pre-school children from two to five or six years of age; to be knowledgeable concerning their physical, mental, emotional, and social growth; to supervise and direct groups of young children, instructing them in simple tasks and projects, songs, games, and discipline.

80. LIBRARY ASSISTING - Prepares the graduate under supervision to perform both reader services and technical services; to assist professional librarians in the selection, purchase and maintenance of the many types of library materials, and to assist the public in their use; under professional supervision to classify and catalog books and other loan items, to do research to secure information requested, and to provide semi-professional reference service to various groups of readers.

81. TEACHER'S AIDE (INSTRUCTIONAL MATERIALS ASSISTING) - The graduate is prepared either to assist the individual teacher in the classroom, or to work as the semi-professional member of an instructional team which may include several teachers with differing levels of experience and proficiency. Under professional supervision teacher's aides assist in the collection, preparation, distribution, and classroom use of diverse kinds of instructional materials, including audio-visuals, records, tapes, charts, programmed learning materials, books, printed excerpts, materials for manipulative skills, etc., the materials varying with both subject area and grade level.

82. RECREATIONAL LEADERSHIP - Prepares the graduate to plan, organize, and direct recreational activities for public, quasi-public, and private organizations maintaining organized leisure-time programs; to direct and supervise water sports and boating activities; to assist in the organization and administration of day-camps and residential camping facilities.

83. OCCUPATIONAL THERAPY - Prepares the graduate to work as the semi-professional member of a medical team whose purpose is to restore maximum function to mentally or physically disabled patients. Under supervision of the professional therapist, helps to select and direct the functional, recreational, educational, and vocational activities designed to meet the specific needs of the patient as outlined by the attending physician.

Portions of these descriptions may be found in the Dictionary of Occupational Titles, the Occupational Outlook Handbook, and other governmental publications; their use is gratefully acknowledged.

APPENDIX B

1. Acknowledgments

2. Selected Sources for Background Information

Acknowledgments

Three Montgomery Junior College faculty members, together with Donald E. Deyo, Dean of the College, and Eileen P. Kuhns, Director of Institutional Research, comprised the research team responsible for the planning and execution of the Technical and Semi-Professional Employment Survey. Mr. William V. Jouvenal and Mrs. Catherine Scott participated in the 19-day research workshops in Summer 1962 and Summer 1963, joined by Mr. James Ross during the second period. In addition, Mr. Jouvenal worked on a partial released time basis both last year and the current year to date, as did Mrs. Scott beginning with this fall term.

Mr. Jouvenal brought to this investigation much valuable knowledge gained from his major role in the 1956 community survey. Sample selection for the current study was carried out under his direction. Mrs. Scott conducted myriad telephone interviews after her talent in this capacity was discovered. Mr. Ross came into the project when a maximum of attention was needed in the area of record control; in addition he conducted several field interviews.

Both in the planning phase during which curriculums were studied and selected for inclusion in the Questionnaire, and in the data collection phase, during which many discussions with employers took place, the broad experience of Mr. Jouvenal in electronics, of Mr. Ross in the physical sciences, and of Mrs. Scott in the business fields made possible a more discriminating approach than would have been the case had the research team been unfamiliar with technical and semi-professional education.

Two College secretaries merit recognition. Mrs. Louise Swindell helped to provide continuity in the research procedures with which she assisted, and Miss Mary Nell Dickerson typed the manuscript.

From other offices and schools within the County system, Mr. Douglas Hall, Mr. Thomas D. Bourdeaux, and Mr. Joseph A. Rice, Jr., made substantial contributions to this project. Mr. Hall directed the data processing, Mr. Bourdeaux produced the Charts, and Mr. Rice assisted with the printing operations. Mr. Bourdeaux is a former Montgomery Junior College student, and Miss Nina E. Stephanoff, who designed the cover, is currently enrolled at the College.

Montgomery Junior College also wishes to express sincere appreciation to the many respondents, who took time from their other responsibilities to complete and return the information requested, or to discuss with College staff members the problems and possibilities of technical and semi-professional employment in their respective establishments. This Survey would not have been possible without their cooperation, which often included comments and suggestions of value to the College beyond the scope of this study.

Selected Sources for Background Information

Pertinent background information is readily available to readers in other recent publications, and thus has not been duplicated in this report. For example, an excellent depth study of the technician may be found in Lynn A. Emerson's Technical Training in the United States. A classic in this field is Ross Henninger's The Technical Institute in America. Associate degree nursing is discussed in J.F. Marvin Buechel's Principles of Administration in Junior and Community College Education for Nursing. Leland L. Medsker's The Junior College: Progress and Prospect presents a comprehensive study of the community college. In addition, these publications contain some extensive bibliographies.

Recent demographic data descriptive of the Washington area may be found in the 1960 *Federal Census*; in the *Skill Survey of the Washington Metropolitan Area 1962-67*, sponsored by the United States Employment Service for the District of Columbia; and in *Business Information Reports*, published in August, 1963 by the Economic Development Committee of the Montgomery County Chamber of Commerce.

Although federal legislation aimed at providing support for community colleges looks promising this year, to date these bills have not completed the various stages prior to enactment, and thus will not be discussed in this report.

The *Skill Survey*, as well as the new *Directory of Science Resources in Maryland* discuss area schools and colleges and their present facilities for providing technical and science-oriented education. The section in the *Directory* dealing with two-year colleges lists the technical and semi-professional curriculums available in the twelve public community colleges located throughout the state.

Both the *Directory of Science* and the Metropolitan Washington Board of Trade's annual *Scientific Resources in the Washington D.C. Area* contain information about individual establishments engaged in scientific and research and development activities.